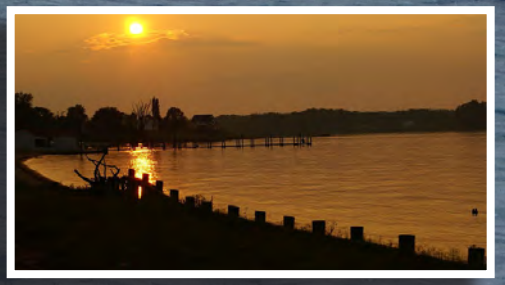


NSF
DAHLGREN

JOINT
LAND USE
STUDY

BACKGROUND REPORT

January 2015

Background Report

January 2015

This study was prepared under contract with King George County, Virginia, with financial support from the Office of Economic Adjustment, Department of Defense. The content reflects the views of the key partners involved in the development of this study including the Town of Colonial Beach, VA, the counties of King George and Westmoreland, VA, and the counties of Charles and St. Mary's, MD, and does not necessarily reflect the views of the Office of Economic Adjustment.

Matrix DESIGN GROUP

NSF DAHLGREN
JOINT LAND USE STUDY

Background Report

Department of Community Development
King George County

Prepared by

Matrix DESIGN GROUP

January 2015

Please see the next page.

POLICY COMMITTEE

The Policy Committee served an active and important role in the development of the NSF Dahlgren Joint Land Use Study. King George County, Virginia would like to thank the following individuals for their review, guidance, and assistance:

Name	Title	Organization
Mark Belton	County Administrator	Charles County
Ken Robinson	Commissioner	Charles County
Bob Fink	Director of Planning and Community Development	Westmoreland County
Ruby Brabo	Supervisor	King George County
Dale W. Sisson	Supervisor	King George County
Mike Ham	Mayor	Colonial Beach
Todd Morgan	Commissioner	St Mary's County
Tony Scaramozzi	Chair	King George County Planning Commission
Capt. Mary Feinberg	Commanding Officer	Naval Support Activity South Potomac
Travis Quesenberry	County Administrator	King George County

TECHNICAL ADVISORY GROUP

The Technical Advisory Group served an active and important role in the development of the NSF Dahlgren Joint Land Use Study. King George County, Virginia would like to thank the following individuals for their review, guidance, and assistance:

Name	Title	Organization
Jack Green	Director	King George County Department of Community Development
Amy Blessinger	Planner III	Charles County Department of Planning and Growth Management
Phil Shire	Director, Land Use and Management	St. Mary's County
Van Foulds	Colonial Beach	Town Manager
Chris Thomas	General Manager	King George County Service Authority
Mike Coleman	Military Relations Liaison	Veterans Affairs and Homeland Security
Mike Paone	Senior Planner	Maryland Department of Planning
Cmdr. Jeffrey Brancheau	Public Works Officer	Naval Support Activity South Potomac, Dahlgren Site
Lt. Majorie Gruber	Assistant Public Works Officer	Naval Support Activity South Potomac, Dahlgren Site
Emery Nauden	Community Planning Liaison Officer	Naval Support Activity South Potomac, Dahlgren Site
Cmdr. Christopher Zayatz	Executive Officer	Naval Support Activity South Potomac, Dahlgren Site
Stephen Eckel	Chief Infrastructure Engineer	Naval Surface Warfare Center Dahlgren Division
Jeron Hayes	Public Affairs Officer	Naval Support Activity South Potomac
James K. Beazley	Government Affairs Representative	Dominion Power
Vaughn Mahaffey	Chair, Military Affairs Council	Fredericksburg Regional Chamber of Commerce
Mike Finchum	Director	Caroline County, VA Planning and Community Development

JLUS CONSULTANT

Matrix DESIGN GROUP

Michael Hrapla, Project Manager

Celeste Werner, AICP, Deputy Project Manager

Jeanette Studley, Planning Lead

Patrick Small, AICP, Senior Planner

Please see the next page.

Table of Contents

Tables and Figures

A

AA	Anti-Aircraft
AE	Ammunition and Explosive
APZ	Accident Potential Zone
ASMFC	Atlantic States Marine Fisheries Commission
ATRC	Aegis Training and Readiness Center

B

BGEPA	Bald and Golden Eagle Protection Act
BMD	Ballistic Missile Defense
BPRF	Blossom Point Research Facility

C

CAA	Clean Air Act
CBD	Chemical/Biological Defense
CDNL	C-Weighted Day-Night Average Levels
CEDS	Comprehensive Economic Development Strategy
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
CO2	Carbon Dioxide
COA	Certificate of Authorization
COMREL	South Potomac Community Relations Council
CP	Comprehensive Plans
CSCS	Center for Surface Combat Systems
CTP	Consolidated Transportation Program
CWA	Clean Water Act
CZ	Clear Zone
CZMA	Coastal Zone Management Act
CZMARA	Coastal Zone Management Act Reauthorization Amendments

D

dBA	A-weighted decibels
dBP	Peak Sound Level
DGIF	Department of Game and Inland Fisheries
DNL	Day-Night Average Sound Level
DNR	Department of Natural Resources
DOD	Department of Defense
DOE	United States Department of Energy

E

E3	Electromagnetic Environmental Effects
EA	Environmental Assessment
EAP	Encroachment Action Plan
EEA	Experimental Explosives Area
EIS	Environmental Impact Statement
EM	Electromagnetic
EMI	Electromagnetic Interference
EOD	Explosive Ordnance Disposal

EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESQD	Explosive Safety Quantity Distance

F

FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FONSI	Finding of No Significant Impact

G

GGRA	Greenhouse Gas Emissions Reduction Act
GHG	Greenhouse Gas

H

HUD	United States Department of Housing and Urban Development

I

IBC	International Building Code
ICUZ	Installation Compatibility Use Zone
IDA	Intensely Developed Area
IGA	Intergovernmental Agreements
in	Inches
INRMP	Integrated Natural Resource Management Plan

J

JLUS	Joint Land Use Study
JWAC	Joint Warfare Analysis Center

L

LDA	Limited Development Area
Ldn	Day Night Average Sound Level
LDZ	Lower Danger Zone
LOS	Level of Service
LUPZ	Land Use Planning Zone

M

MDZ	Middle Danger Zone
MEA	Maryland Energy Administration
mm	Millimeters
MMIC	Maryland Military Installation Council
MMtCO2e	Million Metric Tons of CO2e
MOATS	Maginot Open Air Test Site
MOU	Memorandums of Understanding
MRA	Military Review Area

N

NAAQS	National Ambient Air Quality Standards
NACo	National Association of Counties
NAICS	North American Industry Classification System
NAVFAC	Naval Facilities Engineering Command
NDW	Naval District Washington
NEPA	National Environmental Policy Act
NEW	Net Explosive Weight
NGOs	Non-Governmental Organizations
NLR	Noise Level Reduction

nm	Nautical Miles
NNCBPAA	Northern Neck Chesapeake Bay Public Access Authority
NNCBRP	Northern Neck Chesapeake Bay Region Partnership
NNPDC	Northern Neck Planning District Commission
NNTC	Northern Neck Tourism Commission
NOAA	National Oceanic and Atmospheric Administration
NOSSA	Naval Ordnance Safety and Security Activity
NPDES	National Pollutant Discharge Elimination System
NSASP	Naval Support Activity South Potomac
NSF	Naval Support Facility
NSWC	Naval Surface Warfare Center
NSWCDD	Naval Surface Warfare Center Dahlgren Division
NTIA	National Telecommunications and Information Administration

O

OEA	Office of Economic Adjustment

P

PC	Policy Committee
PDR	Purchase of Development Rights
PFAs	Priority Funding Areas
POV	Privately Owned Vehicles
PRTR	Potomac River Test Range
PSA	Primary Settlement Area
PSC	Public Service Commission
PWSA	Ports and Waterways Safety Act

R

RCA	Resource Conservation Area
RDT&E	Research, Development, Testing, and Engineering
REPI	Readiness and Environmental Protection Initiative
RF	Radio Frequency
RFI	Radio Frequency Interference
RGGI	Regional Greenhouse Gas Initiative
ROD	Record of Decision
RPS	Renewable Energy Portfolio Standard
RSIP	Regional Shore Infrastructure Plan

S

SB	Senate Bill
SET	Stronger Economies Together
SIPs	State Implementation Plans
SIPS	Sound Intensity Prediction System
SRT	State Report on Transportation
SUA	Special Use Airspace

T

TAG	Technical Advisory Group
TIA	Transportation Impact Analysis
TOD	Transit Oriented Development

U

UAV	Unmanned Aerial Vehicle
UDZ	Upper Danger Zone
UGV	Unmanned Ground Vehicle
US	United States
USBC	Uniform Statewide Building Code
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USV	Unmanned Surface Vehicle

V

VCERC	Virginia Coastal Energy Research Consortium
VDOT	Virginia Department of Transportation
VEZ	Virginia Enterprise Zone
VFR	Visual Flight Rules
VMRC	Virginia Marine Resources Commission

W

WPC	Waterfront Planned Community

1. Introduction

Inside Chapter 1 . . .

Military installations are critical to local economies, generating thousands of jobs and millions of dollars in annual economic activity and tax revenue. Historically, incompatible development has been a factor in the loss of training operations and restructuring of mission-critical components to other various military installations. To protect the missions of military installations and the health of economies and industries that rely on them, encroachment must be addressed through collaboration and joint planning between installations and local communities. This Joint Land Use Study (JLUS) attempts to facilitate the mitigation of future issues and improve coordination between the local communities and the Naval Support Facility Dahlgren (NSF Dahlgren).

NSF Dahlgren is situated in King George County, Virginia on the Northern Neck of Virginia along the Potomac River. The installation is located on approximately 4,300 acres split between two tracts of land. The larger tract is referred to as Mainside and the small tract referred to as Pumpkin Neck Annex. The Pumpkin Neck Annex is also more commonly referred to as the Experimental Explosives Area (EEA).

Several communities are partners in this JLUS including: the Town of Colonial Beach, King George County, and Westmoreland County in Virginia, and Charles County and St. Mary's County in Maryland. This JLUS was developed as a means to promote and coordinate the compatibility of future growth around the installation with military mission activities, an organized communication effort between NSF Dahlgren, the partner communities, and other stakeholder entities that own or manage land and / or resources in the region.

The NSF Dahlgren JLUS advocates a proactive approach to encourage increased communication about decisions relating to land use regulation, conservation and natural resource management issues affecting both the community and the military. This study seeks to avoid conflicts previously experienced between the United States (US) military and local communities in other areas of the US and throughout the world by engaging the military and local decision-makers in a collaborative multi-agency planning process.

What Is a Joint Land Use Study?

A JLUS is a planning process accomplished through the collaborative efforts of stakeholders in a defined study area. These stakeholders include local community, state, and federal officials, residents, business owners, nongovernmental organizations, and the military who come together to identify compatible land uses and growth management guidelines within, and adjacent to, active military installations. The intent of the process is to establish and encourage a working relationship among military installations and their proximate communities to act as a team to prevent and / or reduce compatibility issues associated with future mission expansion and local growth. Although primarily federally funded by the Department of Defense (DOD), Office of Economic Adjustment (OEA), a JLUS is produced by and for local communities. The project sponsor / grantee for the NSF Dahlgren JLUS is King George County, VA.

JLUS Goal and Objectives

The goal of the NSF Dahlgren JLUS is to protect the viability of current and future operations, while simultaneously guiding community growth, sustaining the environmental and economic health of the region, and protecting public health, safety, and welfare.

To help meet this goal, three primary JLUS objectives were identified.

- **Understanding.** Convene community and military representatives to identify, confirm, and understand the compatibility issues and concerns in an open forum, taking into consideration both the community's and military's perspectives and needs. This includes increasing public awareness, education, and opportunities for input organized in a cohesive outreach program.
- **Collaboration.** Encourage cooperative land use and resource planning among NSF Dahlgren and surrounding communities so that future community growth and development are compatible with the operational missions at NSF Dahlgren, while at the same time seeking ways to reduce operational impacts on adjacent land within the study area.
- **Actions.** Provide a set of mutually supported tools, activities, and procedures from which local jurisdictions, agencies, and NSF Dahlgren can select, prepare, and approve / adopt and to ultimately implement the recommendations developed during the JLUS process. The actions proposed include both operational measures to mitigate installation impacts on surrounding communities and local government and agency approaches to reduce community impacts on military operations. These tools will help decision makers resolve compatibility issues and prioritize projects within the annual budgeting process of their respective entity / jurisdiction.

Why Prepare a Joint Land Use Study?

Although military installations and nearby communities may be separated by a defined property boundary they often share natural and manmade resources such as land use, airspace, water, and infrastructure. Despite the many positive interactions among local jurisdictions, agencies, and the military, and because so many resources are shared, the activities or actions of one entity can pose unintended impacts on another, resulting in conflicts. As communities develop and expand in response to growth and market demands, land use approvals have the ability to locate potentially incompatible development closer to military installations and operational areas. The result can initiate new, or exacerbate existing, land use and other

compatibility issues, often referred to as encroachment, which can have negative impacts on community safety, economic development, and sustainment of military activities and readiness. This threat to military readiness is currently one of the military's greatest concerns.

Collaboration and joint planning among military installations, local communities, and agencies should occur to protect the long-term viability of existing and future military missions. Working together also enhances the health of economies and industries of communities before incompatibility becomes an issue. Recognizing the close relationship that should exist between installations and adjacent communities, OEA implemented the JLUS program in an effort to mitigate existing and future conflicts and enhance communication and coordination among all affected stakeholders. This program aims to preserve the sustainability of local communities within the JLUS study area while protecting current and future research, development, testing, and engineering (RDT&E) missions supported by tenant commands within NSF Dahlgren.

Regional Economic and Local Importance

NSF Dahlgren has a significant economic impact on the local economy. The commands within NSF Dahlgren employed over 7,600 personnel in the year 2013, including over 4,700 civilians, more than 420 military personnel, and over 2,500 contract employees. For this same year, the annual personnel payroll totaled approximately $523 million ($484 million civilian; $39 million military). An additional $2.1 billion was spent on contracts, $560 million of which was local.

Source: NSF Dahlgren Fact Sheet, 2014

National and State Strategic Importance

In addition to being a major contributor to the economic health of the region, NSF Dahlgren is a unique asset within the DOD. NSF Dahlgren is home of the Naval Surface Warfare Center, Dahlgren Division (NSWCDD), which provides research, development, test and evaluation, analysis, systems engineering, integration and certification of complex naval warfare systems related to surface warfare. NSWCDD also provides systems integration and certification for weapons, combat systems and warfare systems. The Division also delivers innovative solutions for emerging warfighter challenges by leveraging our core naval warfare systems development and integration capabilities for electric weapons, cyber warfare and mission engineering analysis.

Sources: Dahlgren Master Plan; cnic.navy.mil homepage

Community Activities and Stewardship

NSF Dahlgren has a long history of positive interaction with the local community and King George County. Many county residents work at NSF Dahlgren or know someone that works there. Both the Navy and its King George community residents share a unique partnership that is rooted in shared values of patriotism, national defense, and economic vitality. NSF Dahlgren acts as a partner, contributing to the local community through various events and programs such as participating in the King George Fall Festival and providing mutual support for fire and rescue services. NSF Dahlgren tenant commands also sponsor internships, provide mentors in local schools, send speakers to local organization meetings, and sponsor blood drives and other community-based initiatives.

Along with NSF Indian Head, NSF Dahlgren participates in the South Potomac Community Relations Council (COMREL). This council was established to serve as a conduit for improved communication and coordination between military and civilian communities of NSA South Potomac.

NSF Dahlgren and its tenant commands are also involved with an array of other local organizations and groups including:

- Virginia Military Advisory Council
- Maryland Military Installation Council
- South Potomac Civilian-Military Community Relations Council
- Fredericksburg Chamber of Commerce Military Affairs Council
- Potomac Gateway Alliance
- Tri-County Council for Southern Maryland
- Western Charles County Business Association
- King George Chamber of Commerce
- Charles County Chamber of Commerce

- Dahlgren District Town Hall Meetings
- Cobb Island Citizens' Association
- Swan Point Property Owners' Association
- Dahlgren Heritage Foundation
- Dahlgren Lions Club
- Fredericksburg Area Association of Realtors
- Fredericksburg Chamber Regional Alliance

Sources: NSF Dahlgren Brief, October 2013

Public Outreach

The JLUS process was designed to create a locally relevant document that builds consensus and garners stakeholder support. To achieve the JLUS goals and objectives, the NSF Dahlgren JLUS process included a public outreach program that provided a variety of participation opportunities for interested parties to contribute.

Stakeholders

An early step in any planning process is stakeholder engagement. Informing or involving them early is instrumental to the identification and resolution of their most important issues through the development of integrated strategies and measures. Stakeholders include individuals, groups, organizations, and governmental entities interested in, affected by, or affecting the outcome of the JLUS document. Stakeholders identified for the JLUS include, but are not limited to, the following:

- Local jurisdictions (town and counties)
- DOD officials (including OEA representatives) and military personnel
- Local, regional, and state planning, regulatory, and land management agencies
- Landholding and regulatory federal agencies
- The public (residents, landowners, and business owners)
- Environmental advocacy organizations
- Nongovernmental organizations
- Other special interest groups (including local educational institutions and school districts)

Policy Committee and Technical Advisory Group

The development of the NSF Dahlgren JLUS was guided by two committees, comprising town and county leaders, NSA South Potomac / NSF Dahlgren personnel, federal and state agencies, resource agencies, local governments, and other organizations including the Fredericksburg Regional Chamber of Commerce and Dominion Power.

JLUS Policy Committee (PC). The PC consists of officials from participating jurisdictions, military installation leadership, and representatives from other interested and affected agencies. The PC is responsible for the overall direction of the JLUS, preparation, and approval of the study design, approval of policy recommendations, and approval of draft and final JLUS documents.

JLUS Technical Advisory Group (TAG). The TAG is responsible for identifying and studying technical issues. Membership includes town and county planners, military base planners, business and development community representatives, natural resource protection organizations, and other subject matter experts as needed to help assist in the development and evaluation of implementation strategies and tools. Items discussed by the TAG were brought before the PC for consideration and action.

The PC and TAG served as liaisons to their respective stakeholder groups - charged with conveying committee activities and information to their organizations and constituencies and relaying their organization's comments and suggestions to both committees for consideration. The PC members were encouraged to conduct meetings with their organizations and / or constituencies to facilitate this input. The responsibilities and list of participants for the JLUS sponsors, the PC, and the TAG are identified in Tables 1-1, 1 2, and 1-3, respectively.

Table 1-1. JLUS Sponsor Responsibilities and Participants

Responsibilities	Participants
■ Coordination ■ Financial Contribution ■ Accountability ■ Grant Management	■ King George County, VA

Table 1-2. JLUS Policy Committee Responsibilities and Participants

Responsibilities	Participants
■ Policy Direction ■ Study Oversight ■ Monitoring ■ Report Adoption	■ Charles County, MD ■ Town of Colonial Beach, VA ■ King George County, VA ■ St. Mary's County, MD ■ Westmoreland County, VA ■ NSF Dahlgren

Table 1-3. JLUS Technical Advisory Group Responsibilities and Participants

Responsibilities	Participants
■ Identify Issues ■ Provide Expertise to Address Technical Issues ■ Evaluate and Recommend Implementation Options to the PG ■ Provide Draft and Final Report Recommendations to the PC	■ Charles County, MD ■ King George County, VA ■ St. Mary's County, MD ■ Town of Colonial Beach, VA ■ Westmoreland County, VA ■ Virginia Veteran Affairs and Homeland Security ■ Maryland Department of Planning ■ Fredericksburg Regional Chamber of Commerce, Military Affairs Council ■ Dominion Power ■ NSWC, Dahlgren Division ■ NSA South Potomac ■ NSF Dahlgren

Meetings were held throughout the process to ensure the JLUS identified and appropriately addressed local issues. The meetings conducted are highlighted as follows:

- **Kick-Off Meeting # 1 (September 2013).** This meeting served as the initial kick-off for the Policy Committee (PC). During this meeting, the JLUS team provided an overview of the NSF Dahlgren mission, introduced the JLUS process and participants, and presented information on the compatibility factors evaluated in this JLUS.
- **Meeting # 2 (October 2013).** The second committee meeting was held as a Technical Advisory Group (TAG) meeting for the purposes of introducing the JLUS process and participants to the TAG, presenting information on the compatibility factors. An interactive survey was also conducted in order to gauge the perceived level of concern of compatibility factors by the TAG members.
- **Meeting # 3 (March 2014).** A TAG meeting was held on March 6, 2014 to review and discuss the input provided by, and results of issue prioritization conducted by, the TAG. Both the list of issues and an update on the treatment of ongoing projects in the region were discussed in order to obtain consensus on priority compatibility factors and issues and how they should be assessed in the JLUS.
- **Meeting #4 (March 2014).** The next meeting, held on March 25, 2014, was conducted with the PC to review and describe the refined compatibility issues and discuss the study area and treatment of military footprint based on both existing and future operations.
- **Meeting #5 (June 2014).** The next TAG meeting was conducted on June 8, 2014. The focus of this meeting was to confirm compatibility issues being assessed, identify their appropriate level of impact based on geography, and discuss and understand potential tools that may be developed to resolve conflicts.
- **Meeting # 6 (October 2014).** A TAG meeting was held on October 9, 2014, to review the status of the JLUS, strategy development, and introduce the strategy table. Discussion focused on a review of strategies for validation, to understand how they can be applied, and to address questions from the TAG in their review of the strategies.

- **Meeting # 7 (TBD).** Both TAG and PC meetings were conducted to review the Draft JLUS, review public input received to date, and determine changes for the Final JLUS.

Public Forums

In addition to the PC and TAG meetings, a series of public forums were held throughout the development of the JLUS. These forums provided an opportunity for the exchange of information with the greater community, assisted in identifying the issues to be addressed in the JLUS, and provided input on the proposed strategies. Each forum included a traditional presentation and a facilitated exercise providing a "hands on," interactive opportunity for the public to participate in the development of the plan. The public forums conducted are highlighted as follows:

- **Public Forum # 1 (March 2014).** The first forum was held on March 25, 2014 at the Dahlgren Mary Washington University Campus. The JLUS team explained the purpose and function of the JLUS, provided an overview of the military operations at NSF Dahlgren, introduced project participants, and shared the JLUS approach and goals. The format of this meeting included a presentation followed by an interactive working session where attendees were invited and encouraged to share their input on potential JLUS issues using an interactive audience response system that displayed real time results. The JLUS Overview / Compatibility Factors fact sheet was also distributed for use in completing the exercise.
- **Public Forum # 2 (October 2014).** The second set of public forums were held on October 9, 2014 at the Dahlgren Mary Washington University Campus, to review the status of the JLUS process, review the compatibility issues that have been identified to date, and obtain community input to prioritize the issues. The public was invited to provide additional issues that they felt were not captured through previous meetings.

Presentation at Public Forum #2

- **Public Forum # 3 (TBD).** The next public forum was held to present the Draft JLUS recommendations and solicit public feedback. This set of public meetings was held in conjunction with an already established public forum with the governing body of each participating jurisdiction. The public and interested stakeholders were encouraged to provide feedback through the use of an audience response system, one-on-one interaction with the JLUS team, through hand written comments cards, and through the project website.
- **Public Forum # 4 (TBD).** The final public forum was conducted to present the Final JLUS report after the public comment period had concluded. The presentation included an explanation of the overall JLUS methodology, including the identification of issues and strategies. An overview of public comments received and was also discussed.

Public Outreach Materials

JLUS Fact Sheet / Compatibility Factors Brochure. At the beginning of the JLUS project, a JLUS Fact Sheet was developed describing the JLUS program, objectives, an overview of the compatibility factors that would be analyzed throughout the project, methods for public input in the process, and background on NSF Dahlgren JLUS including a study area map. This Fact Sheet was made available at the meetings for review by interested members of the public.


NSF DAHLGREN JOINT LAND USE STUDY

FACT SHEET #1: OVERVIEW / COMPATIBILITY FACTORS

What is a Joint Land Use Study?

What Are the JLUS Objectives?

Why is it Important to Partner with NSF Dahlgren?

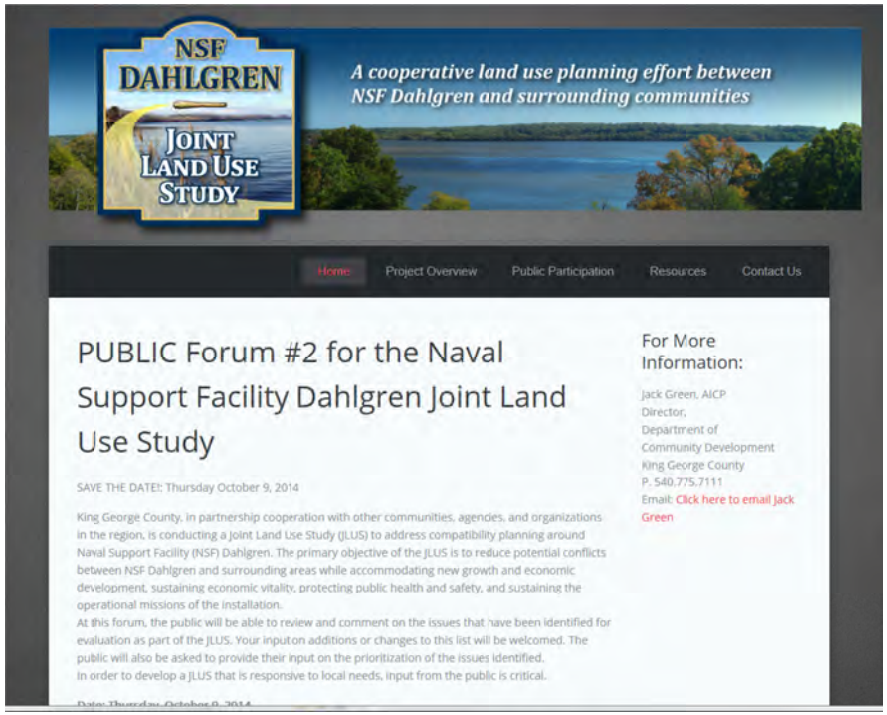
Who Will Guide the JLUS Development?

Stay up-to-date on the NSF Dahlgren JLUS at www.dahlgrenjlus.com

NSF Dahlgren JLUS Fact Sheet #1

Strategy Tools Brochure. JLUS strategies constitute a variety of actions that local governments, military installations, agencies, and other stakeholders can take to promote compatible land use planning. This brochure provides an overview of the strategy types that can be applied to address compatibility issues around NSF Dahlgren.

Website. A project website was developed and maintained that provided stakeholders, the public, and media representatives with access to project information. This website was maintained for the entire duration of the project to ensure information was easily accessible. Information contained on the website included program points of contact, schedules, documents, maps, public meeting information, and downloadable comment forms. The project website is located at www.dahlgrenjlus.com.



NSF Dahlgren JLUS Website

JLUS Study Area

NSF Dahlgren is situated in the Northern Neck of Virginia, on two small peninsulas along the Potomac River. The installation comprises two areas referred to as Mainside and Pumpkin Neck Annex separated by the Upper Machodoc Creek. The installation is located on approximately 4,300 acres within King George County, a primarily rural county.

The NSF Dahlgren study area is designed to address all areas near NSF Dahlgren that may impact current or future military operations or be impacted by operations. Due to its location and operations conducted over the Potomac River, the general JLUS study area was identified as the installation, the Potomac River Test Range (PRTR) including the Upper Danger Zone (UDZ), the Middle Danger Zone (MDZ), and the Lower Danger Zone (LDZ), and the surrounding jurisdictions of Charles County, MD; the Town of Colonial Beach, VA; King George County, VA; St. Mary's County, MD; and Westmoreland County, VA, depicted in Figure 1-1.

The primary characteristics evaluated in determining the study area were compatibility factors associated with military mission operations and land use including future development impacts, noise and vibration, and transportation.

Sources: Dahlgren EIS pp 2-1 to 2-9; Dahlgren Fact Sheet, Google Maps

JLUS Background Report Organization

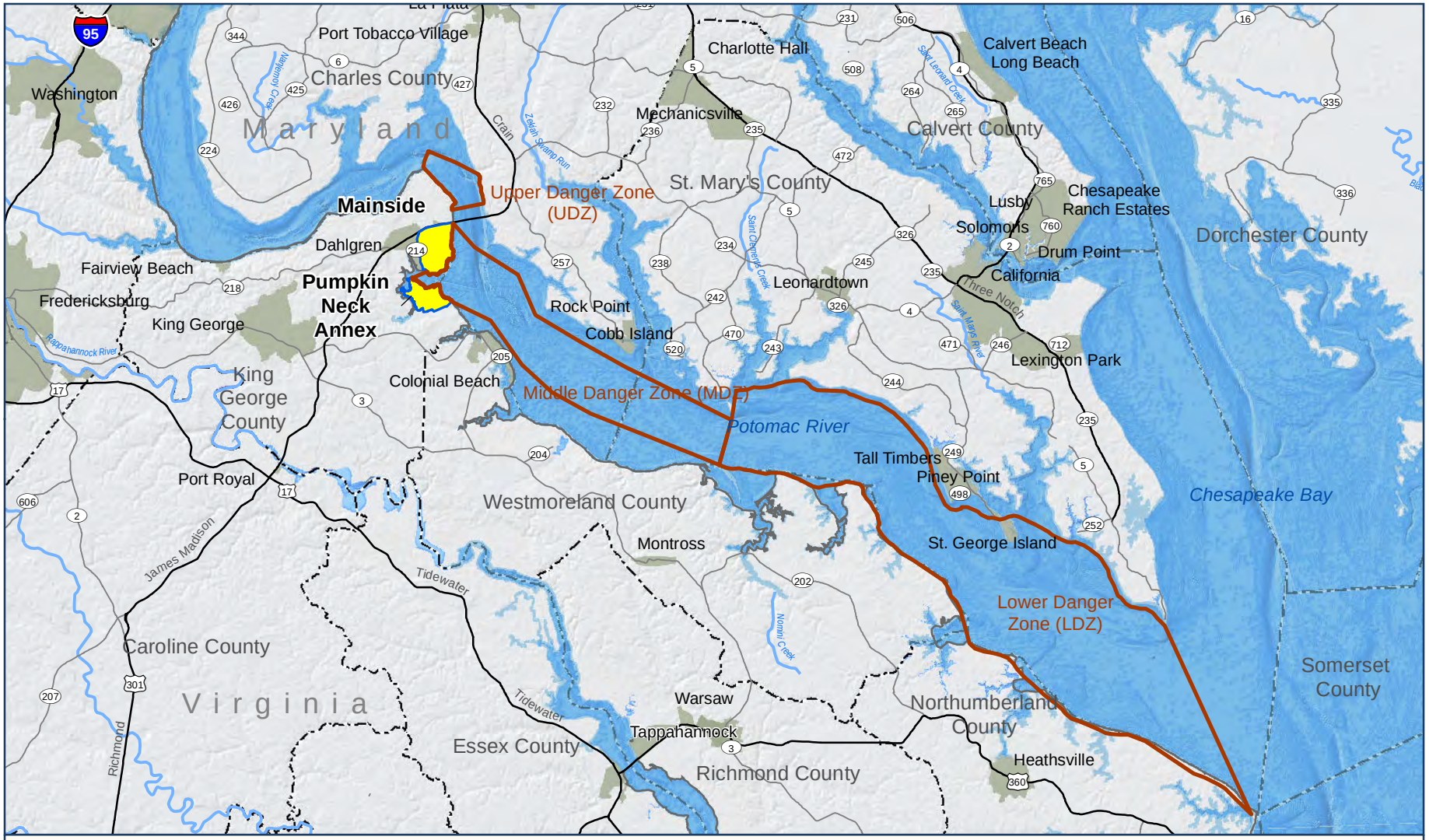
The following is a brief overview of the organization of the NSF Dahlgren JLUS Background Report, including the contents of each chapter.

Chapter 1: Introduction. Chapter 1 provides an introduction and overview of the NSF Dahlgren JLUS. This chapter describes the strategic and local importance of NSF Dahlgren, the background and intent of the JLUS, the objectives used to guide development of the JLUS, the stakeholders involved in developing the JLUS, public outreach methods, implementation premise, and Background Report organization.

Chapter 2: Community Profile. In developing this JLUS, an informed understanding of NSF Dahlgren and local jurisdictions within the study area is necessary. This chapter introduces the communities that are within the JLUS study area and provides an overview of the region's growth potential including population, housing, transportation, and important environmental and historical areas.

Chapter 3: Military Profile. The military profile discusses the military presence and activities within the study area including the military missions and strategic and local importance of NSF Dahlgren. It is important to identify the military operating areas and current and possible future missions that take place in the study area to appreciate how the military operations could potentially impact, or be impacted by, the surrounding communities.

Chapter 4: Existing Compatibility Tools. This chapter provides an overview of existing relevant plans, programs, and studies that are tools to address compatibility issues. The applicable tools are reviewed to evaluate their effectiveness for addressing the compatibility issues identified and described in Chapter 5.



Source: Dahlgren NSF, 2013

Fig1-1_NSF_Dahlgren_StudyArea_20141014_JKC.pdf

Figure 1-1: Study Area

Chapter 5: Compatibility Assessment. This chapter provides the compatibility issues and analysis identified for the NSF Dahlgren JLUS study area. These issues were identified based on input from the PC and TAG, members of the public, existing plans and technical reports, and evaluation by the project team. This chapter enumerates the issues and categorizes them into the following 25 compatibility factors:

- Air Quality
- Alternative Energy Development
- Anti-Terrorism / Force Protection
- Biological Resources
- Climate Adaptation
- Cultural / Historic Resources
- Dust, Smoke, and Steam
- Frequency Spectrum Capacity
- Frequency Spectrum Interference / Impedance
- Infrastructure Extensions
- Interagency Coordination / Communication
- Land and Air Spaces
- Land Use
- Legislative Initiatives
- Light and Glare
- Local Housing Availability
- Marine Environments
- Noise
- Public Trespassing
- Roadway Capacity
- Safety
- Scarce Natural Resources
- Vertical Obstructions
- Vibration
- Water Quality / Quantity

Inside Chapter 2 . . .

Introduction

This section provides information about the communities surrounding Naval Support Facility (NSF) Dahlgren and the relationship between these civilian and military areas within the Joint Land Use Study (JLUS) study area. Capturing and describing certain characteristics of the participating JLUS communities help provide a baseline context from which informed decisions can be made when assessing compatibility strategies. The goal is to provide information that enables stakeholders to gain an understanding of population and development trends that have the potential to affect the future of NSF Dahlgren, which along with other factors will nurture coherent, informed planning policies about future development and economic growth plans and goals before compatibility issues arise.

Information presented includes general land use, population growth, economic development, housing, and transportation within the region to better appreciate the communities within the study area and their relationship to NSF Dahlgren.

The overall objective of this chapter is to foster an understanding by the military about the types of activities occurring “outside the fence” when considering future missions and operations.

Regional Overview

The study area includes the jurisdictions of King George and Westmoreland counties and the Town of Colonial Beach in Virginia; and Charles and St. Mary's counties in Maryland. The landscape within the study area comprises coastal lowlands characteristic of the Chesapeake Bay and its tributaries. This area has been used for agriculture since the earliest settlements were established by English colonists in the 17th century. The area has largely maintained its rural nature with small communities located along state routes and US highways which run through the woodlands and farms of the Potomac River valley. The long peninsula on which NSF Dahlgren is located is part of the area known as the Northern Neck of Virginia.

Many jurisdictions within the study area have implemented urban growth control measures to maintain the rural nature of the area through their comprehensive plans and zoning ordinances. As the region's economy has shifted away from manufacturing, tourism has become an important source of jobs, which has supported these open space preservation initiatives. Open space preservation has helped to preserve the rural and agricultural character of the area, which has made it an increasingly more attractive place for rural residential development and visitors. The military installation at NSF Dahlgren and the associated industries have an enormous impact on local economies, which are further discussed in the following chapter.

King George County

King George County shoreline along the Potomac River

King George County was formed in 1720 from parts of the upper portion of what was then Richmond County. The county then expanded to include Potomac River frontage in 1776. Throughout the 17th and 18th centuries, Virginia's agricultural economy was rooted in plantation/ tobacco-farming. Within the area later developed as the Dahlgren Naval Proving Ground, several plantations were present during this period. The area surrounding the future location of the community of Dahlgren remained sparsely settled until the mid-19th century. By the 1860s, small settlements were concentrated along the Potomac River shoreline. During the Civil War, large portions of King George County were occupied by Union soldiers. A number of Confederate networks were also established in the county because of its riverfront location and proximity to Maryland.

The county is located between Stafford County to the west and Westmoreland County to the east, and bordered by the Rappahannock River and Caroline County to the south, and the Potomac River to the north. King George County is mostly rural in nature, and is host to NSF Dahlgren at its eastern edge along the Potomac River. The county had a population of 23,584 people in 2010. Major employers in the county include NSF Dahlgren, the King George County Public School Board, the County of King George, Wal-Mart, and numerous Department of Defense contractors supporting NSF Dahlgren commands.

Sources: King George County Homepage, accessed November, 2013; Virginia Employment Commission, 2013; US Census 2010; NSWCDD, 1998; NSF Dahlgren and Engineering Field Activity Chesapeake, 2006

Westmoreland County

In 1651, what was the original Northumberland County, Virginia was divided into four new counties – Northumberland, Lancaster, Richmond and Westmoreland counties. The boundaries of Westmoreland County were redrawn a number of times, with the final adjustments made in 1778. By 1660, nearly all the waterfront property and much of the interior of the Northern Neck of Virginia had been settled.

Westmoreland County is located immediately southeast of NSF Dahlgren. The County is bordered by the Potomac River to the north, Northumberland County to the east, the Rappahannock River and Richmond County to the south, and King George County to the west. The county was originally an area of widespread farming. During the 19th century, Westmoreland County's economy was (and still remains) primarily based in agriculture. However, one major economic generator for the county is the tourist destination of Colonial Beach. In recent years, the County has attracted new growth from expansion of the Washington, D.C.-area which continues to

bring new residences. Currently, farming, fishing, and the lumber industry remain vital elements of the Westmoreland County economy. The county is working to diversify, bringing in new, small manufacturing businesses, and strengthening its ties with NSF Dahlgren. Historical tourism also provides a strong economic base for the County. There are two incorporated towns in the county, Colonial Beach and Montross (the county seat). The largest employers in the county today include the Westmoreland County School District, Bevans Oyster Company, Carry On Trailer Corporation, Potomac Supply Corporation and Town of Colonial Beach School District. The 2010 population in Westmoreland County was 17,454.

Sources: US Census 2010; Virginia Employment Commission, 2013; Westmoreland County Comprehensive Plan, 2010

Agrarian heritage of Westmoreland County

Town of Colonial Beach

Colonial Beach on the Potomac River

The Town of Colonial Beach began as a sunbathing and fishing resort in the 19th century, with visitors arriving by boat from Washington, DC. The town was incorporated in 1892 and served as a docking location for ships bound from Baltimore, MD and Norfolk, VA to Washington, DC, which established a vibrant resort industry. The lure of beaches and waterfront property started a building boom of Victorian-style homes, summer cottages and large hotels. During the mid-to-late 20th century, Colonial Beach declined as vacationers' preferences changed in favor of ocean beach resorts rather than riverfront resorts. Economic decline was felt through the late-20th century with a decline in seafood harvesting and manufacturing, and the legalization of gambling. In more recent times, Colonial Beach has rebounded, based on its proximity to Washington, DC and Richmond, Virginia. The close proximity of NSF Dahlgren to the Town of Colonial Beach, located three miles to the northwest from the downtown area, has made it a major contributor to year round residents and economic activity. The expansion of the Washington, D.C. metropolitan area has again made the town a popular vacation area, second home community, and retirement location. The 2010 population of Colonial Beach was 3,542.

Sources: Town of Colonial Beach Comprehensive Plan, 2009; U.S. Census 2010

Charles County

Charles County is located immediately north of NSF Dahlgren on the northern shore of the Potomac River. The County was established in 1658 by an Order in Council as part of the Maryland colony. The area historically served as a center for agriculture, but is experiencing development pressure from the expanding Washington, D.C. metropolitan area. The county's

population in 2010 of 146,551 people and is expected to continue to grow in coming years as the county continues to be one of the fastest growing counties in Maryland. Major employers in the county include the Charles County Board of Education, Naval Support Facility (NSF) Indian Head, the Charles County Government, and the College of Southern Maryland.

Sources: Draft Charles County Comprehensive Plan, 2014; Charles County Zoning Ordinance, 2010; Maryland State Archives Homepage, accessed October 2013; Maryland Department of Business and Economic Development, Brief Economic Facts Charles County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010

Charles County Courthouse

St. Mary's County

First settled in 1634, St. Mary's County is located between the Patuxent River to the north, the Chesapeake Bay to the east, the Potomac River to the south, and Charles County to the west. The area is composed of rolling lowlands used for agriculture, forested areas, and open space. State Routes 5 and 235 pass through the county. The county includes numerous bays and state parks which make it a frequent tourist destination, which has greatly contributed to the local economies in recent years. Military, manufacturing, healthcare, and retail/accommodation (associated with tourism) are major industries in the County. Major employers in the county include NAS Patuxent River, St. Mary's Hospital, DynCorp International, and BAE Systems. The 2010 population of St. Mary's County was 105,151.

Sources: St. Mary's County Comprehensive Plan, 2010; St. Mary's County Comprehensive Zoning Ordinance, 2013; Maryland Department of Business and Economic Development, Brief Economic Facts St. Mary's County, Maryland, 2013; Maryland Department of Labor, Licensing, and Regulation Labor Market Report, 2013; US Census 2010

Boats in port at Cobb Island, MD

Study Area Growth Trends

The following section provides a profile of the counties and communities relative to population growth, housing, median home values, and economic growth trends. This information assists in establishing the context for the JLUS and the potential impacts from compatibility issues. These trends illustrate the type of growth which has occurred in the region surrounding NSF Dahlgren, what may be anticipated to occur in the future, and providing valuable insight of where potential incompatibilities between NSF Dahlgren and the communities may develop.

Population Trends and Projections

The population data used below is based on information obtained from the US Census Bureau. Population projections show the overall population trends in specific areas. This trend information assists policymakers in their efforts to make informed decisions about future planning and infrastructure development activities. Table 2-1 shows the population in 2000 and 2010 and shows the percent increase over the decade.

Table 2-1. Study Area Population from 2000 to 2010

Jurisdiction	2000	2010	2000-2010 Change
Maryland	***5,296,486***	***5,773,552***	***9%***
Charles County	120,546	146,551	22%
St. Mary's County	86,211	105,151	22%
Virginia	***7,078,515***	***8,001,024***	***13%***
King George County	16,803	23,584	40%
Westmoreland County	16,718	17,454	4%
Town of Colonial Beach	3,219	3,542	10%

Source: US Census Bureau, 2000-2010

Both Charles and St. Mary's Counties in Maryland experienced a higher rate of growth than Maryland during the ten year period. King George County in Virginia saw the most significant rate of increase in its local population.

The Maryland State Data Center and the Virginia Employment Commission prepared thirty year population growth estimates for their respective states and all counties within their jurisdictions. Population projections were also available for major cities in Virginia, but not at the town level. These projections are provided in Table 2-2.

Table 2-2. Study Area Population Projections from 2010 through 2030

Jurisdiction	2010 Population	2020 Projection	2030 Projection	Percent Change (2010-30)
Maryland	***5,773,552***	***6,216,150***	***6,611,900***	***15%***
Charles County	146,551	174,350	202,150	38%
St. Mary's County	105,151	125,150	148,750	41%
Virginia	***8,001,024***	***8,917,395***	***9,825,019***	***23%***
King George County	23,584	30,126	37,365	58%
Westmoreland County	17,454	18,501	19,399	11%
Town of Colonial Beach	Unavailable	Unavailable	Unavailable	N/A

Source: Maryland State Data Center, 2012; Virginia Employment Commission, 2012; US Census Bureau, 2010, Kind George County Comprehensive Plan, 2013

These projections demonstrate a continued rate of growth for the counties in the study area. As local population growth continues, these counties will face the challenge of balancing development control measures with appropriate population growth through land conversion or higher density development. In most study area counties, growth policies outlined by comprehensive plans delineate district or municipal boundaries which are enforced through zoning ordinances at the county level. Zoning ordinances establish infrastructure expansion limitations by detailing allowable land uses for different zones. Many jurisdictions have incorporated open space, rural, agricultural, watershed, or park land uses outside of developed "urban" areas to direct growth and redevelopment into specified development districts.

Economic Growth Trends

The Northern Neck and Chesapeake Bay area is host to a diverse local economy which includes traditional regional economic drivers such as manufacturing and farming, while emerging industries, including research, development, and tourism bring new growth, development, and wealth to the area. According to the North American Industry Classification System (NAICS), which classifies economic activity into major industries and provides employment estimates, the major industries by total employment

in the study area include retail trade; professional, scientific, and technical services; healthcare and social assistance; and accommodation and food services.

Manufacturing played a significant role in the area during the 20th century but has continued to experience a substantial decline in recent years, with nearly each jurisdiction experiencing over a 50 percent reduction in manufacturing-based employment over the past decade. Westmoreland County is an exception to this trend as it has maintained a relatively stable number of manufacturing jobs with manufacturing being the second largest employment sector after government.

In addition, the region is experiencing resurgence in the tourism industry, similar to that seen in other areas around the Chesapeake Bay, which has led to an increase in the number of accommodation and food services jobs, representing nearly 13 percent of total employment in the region.

The State of Virginia has initiated the Virginia Enterprise Zone (VEZ) to promote a partnership between state and local governments to encourage job creation and private investment in specially designated VEZs throughout the state. The Northern Neck Enterprise Zone includes an 11,000 acre area established to promote coordination between state and local government agencies to reward investment with grants and other incentives for development. Areas which are impacted by these incentives include parts of Westmoreland County and the Town of Colonial Beach, which will receive county supported infrastructure improvements to assist in the development of an industrial park in the area. The Northern Neck Planning District Commission has created the Comprehensive Economic Development Strategy (CEDS) to improve coordination between private development, community leaders, educational institutions, and labor groups to promote economic development throughout the Northern Neck region.

Sources: Northern Neck Comprehensive Economic Development Strategy, 2013, Virginia Median Income 2000 to 2011

Table 2-3. Median Income 2000 to 2011

Jurisdiction	2000 Median Income	2007-11 Average Median Income	Percent Change (2000-11)
Maryland	***$52,868***	***$72,419***	***37%***
Charles County	$62,199	$92,135	48%
St. Mary's County	$54,706	$82,529	51%
Virginia	***$46,677***	***$63,302***	***36%***
King George County	$49,882	$82,173	65%
Westmoreland County	$35,797	$52,258	46%
Town of Colonial Beach	$31,711	$45,664	44%

Source: American Community Survey, 2007-2011; US Census Bureau, 2000, Employment Commission, 2013

As indicated by the figures in Table 2-3, the study area has experienced substantial income growth in all jurisdictions. Although income levels continue to increase rapidly, housing affordability many become an issue throughout the region as incomes have not keep pace with the cost of housing, which is discussed in the following section.

Housing Trends

Housing trends are an important indicator of economic activity and vitality that demonstrating the population growth or decline relative to new residential construction within an area. These trends also represent market decisions relative to home ownership versus rental properties and provide important indicators into the affordability of residential dwellings for military personnel associated with an installation. The rate of housing development is also a strong indicator of the overall rate of development taking place in a region, which may result in potential incompatible land uses relative to operations at NSF Dahlgren. Ultimately, housing trends potentially indicate future development and types of residential and commercial development. The following information illustrates the housing market trend including the value of existing housing units, the number of housing and construction permits issued at the county level with the study area, as well as military housing allowances in terms of BAH for

NSF Dahlgren. Table 2-4 shows the change in median monthly gross rents for the region from 2000 to 2011.

Table 2-4. Median Monthly Gross Rent 2000 to 2011

Jurisdiction	2000 Median Rent	2007-11 Average Median Rent	Percent Change (2000-11)
Maryland	***$689***	***$1,139***	***65%***
Charles County	$858	$1,370	60%
St. Mary's County	$719	$1,222	70%
Virginia	***$650***	***$1,024***	***58%***
King George County	$622	$1,002	61%
Westmoreland County	$537	$601	12%
Town of Colonial Beach	$538	$830	54%

Source: American Community Survey, 2007-2011; US Census Bureau 2000

From 2000 to 2011, the median rent increased by a range of 12 to 70 percent in the study area jurisdictions. In the ten year span, every jurisdiction experienced an increase of greater than 50 percent of the year 2000 value for rent. Though this trend is consistent with the rates of rental cost increases within their respective states, it presents an affordability issue on a regional scale.

There are 90 single-family homes and 125 town home units on the NSF Dahlgren installation to accommodate military personnel. These facilities alleviate pressure for off-base housing in local communities. For military personnel who do seek off-base accommodation, the Basic Allowance for Housing, or BAH, is provided to support affordable housing. The BAH is a stipend given to military personnel who choose to live off base or cannot be accommodated in on-base housing, and is designed to augment the costs of living associated with private sector arrangements, including home or apartment rent, utilities, and renters' insurance. The BAH rates for personnel at NSF Dahlgren are provided in Table 2-5 below.

Sources: Department of Defense Military Installations NSF Dahlgren Homepage, accessed November 2013

Table 2-5. BAH Rates at NSF Dahlgren, 2013

Grade	Without Dependents	With Dependents
E-1	$1,011	$1,245
E-2	$1,011	$1,245
E-3	$1,011	$1,245
E-4	$1,011	$1,245
E-5	$1,086	$1,368
E-6	$1,290	$1,719
E-7	$1,335	$1,779
E-8	$1,437	$1,842
E-9	$1,548	$1,962
W-1	$1,293	$1,722
W-2	$1,803	$1,803
W-3	$1,557	$1,881
W-4	$1,734	$1,989
W-5	$1,794	$2,118
O-1E	$1,368	$1,791
O-2E	$1,521	$1,872
O-3E	$1,719	$2,010
O-1	$1,125	$1,407
O-2	$1,338	$1,713
O-3	$1,593	$1,878
O-4	$1,785	$2,166
O-5	$1,821	$2,373
O-6	$1,881	$2,397
O-7	$1,920	$2,421

Source: DahlgrenHousing,com, 2013

According to the 2013 BAH rates for NSF Dahlgren, affordability may be an issue for enlisted soldiers without dependents at Grades E-1 to E-6 in Charles, St. Mary's, and King George counties.

Housing value trends assist in illustrating the changes in land and home values relative to market fluctuations. These fluctuations can be indicative of development activity or inactivity as well as the location or migration patterns of populations. Table 2-6 shows the median housing value trends in the study area from 2000 to 2011.

Table 2-6. Median Housing Values from 2000 to 2011

Jurisdiction	2000 Median Housing Value	2007-11 Average Median Housing Values	Percent Change (2000-11)
Maryland	***$146,000***	***$319,800***	***119%***
Charles County	$153,000	$341,200	123%
St. Mary's County	$150,000	$324,500	116%
Virginia	***$125,000***	***$254,600***	***103%***
King George County	$123,000	$289,800	135%
Westmoreland County	$95,300	$190,000	99%
Town of Colonial Beach	$87,600	$218,300	149%

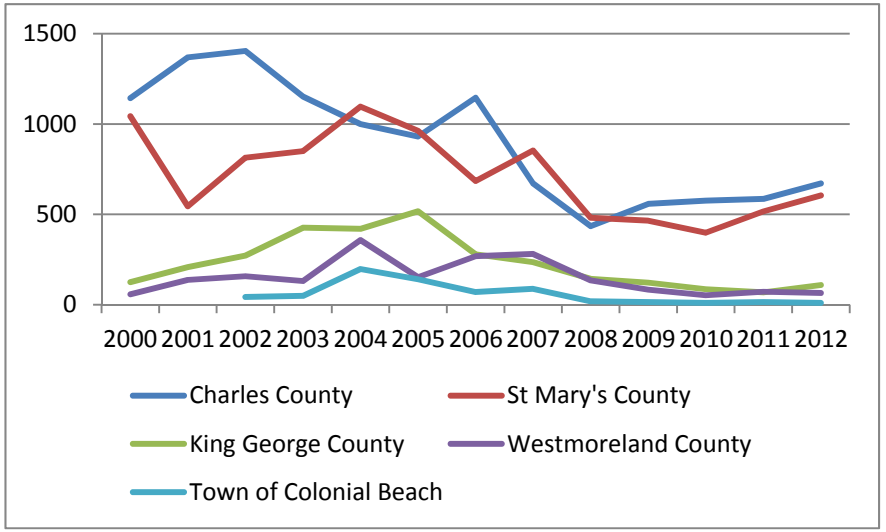
Source: American Community Survey, 2007-2011 US Census Bureau, 2010

The median housing values have more than doubled in most cases, which translate to higher rents and mortgages and increased monthly living expenses for area residents. These increases can strain affordability of the housing stock close to NSF Dahlgren, which in turn can lead to increased commuting distances of military and civilian personnel who are priced out of the local housing market.

The growth of the housing market can also be determined by the number of building permits filed with the counties in the study area. Records since the year 2000 indicate growth in the housing supply in the early 2000s followed by a sharp decline in new housing construction consistent with the mid-decade national economic downturn.

Figure 2-1 shows the supply of newly constructed single family housing units between 2000 and 2012 in the study area. This growth shows the conversion which has taken place as agricultural lands have been developed into residential uses. Many of the counties throughout the study area utilize growth boundaries to manage this development in urban districts around existing community centers and transportation corridors. These growth policies may increase land costs and impact affordability throughout the study area.

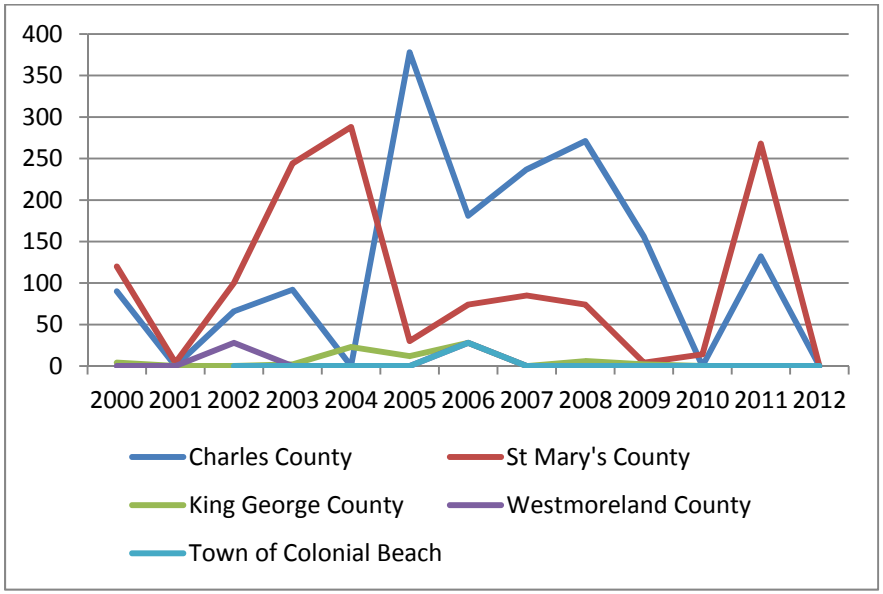
Figure 2-1. Single-Family Building Permits 2000-2012



Source: US Census Bureau 2000-2012.

Housing starts are also illustrated in the availability of multi-family housing (housing with two or more units, such as apartments and condominiums), that are more commonly associated with higher density developments that may be encouraged by urban growth boundaries and more intense land uses common in the study area. Figure 2-2 shows a similar downturn in new construction since the start of the national recession, beginning in 2007.

Figure 2-2. Multi-Family Building Permits 2000 - 2012



Source: US Census Bureau 2000-2012.

The building trends in the study area show growth in the early 2000s followed by slowing which was seen nationwide as a result of the national housing market crash. Recent growth of multi-family housing is evident by an increase in the number of building permits issued, however these trends are exclusive to the counties in Maryland. The Virginia jurisdictions have seen a drop and stagnation in building permits from 2008-2012 in both single family and multi-family housing, which can negatively affect housing availability in these areas.

Current Development Overview within the Study Area

Areas immediately surrounding NSF Dahlgren include the unincorporated community of Dahlgren and the commercial corridor along US Highway 301. These are the most urbanized areas of King George County and the areas targeted for additional growth per the county comprehensive plan. The Dahlgren community is situated immediately west of the NSF Dahlgren fence line. With a population of 2,655 as of the 2010 Census, Dahlgren is characterized by single-family residential development, a small commercial core, with the primary artery through the heart of the community – Dahlgren Road, terminating at the NSF Dahlgren main gate.

Outside of the Dahlgren community and US Highway 301 corridor, the majority of land surrounding NSF Dahlgren is rural, comprising agricultural, forestland, and low density residential uses. Further west of the installation on Interstate-95 lies Fredericksburg, which is the largest incorporated city close to the installation, where higher density development occurs.

The area north, west, and south of NSF Dahlgren includes area in King George County and the western portion of Westmoreland County, including the Town of Colonial Beach. Most of the area in these two counties are zoned for agricultural uses or rural residential. The Town of Colonial Beach is located approximately three miles to the southeast on the southern shores of the Potomac River which includes more intensive residential and commercial development.

NSF Dahlgren is bounded to the east by the Potomac River. The land east of the river is under the jurisdiction of Charles and St. Mary's counties in the state of Maryland. These counties are predominately rural in character with limited development in districts along major highways and arterials. Some of the larger communities in the area include the towns of La Plata and Leonardtown, and the unincorporated communities of Waldorf, Lexington Park, Great Mills, California, and Hollywood.

Transportation

The transportation network throughout the study area has been influenced by the low-lying and coastal topography of the region. The many water features in the area, particularly the Potomac River and Chesapeake Bay create significant geographical barriers to development and transportation. The NSF Dahlgren study area is primarily served by one US Interstate Highway, and is supplemented by a system of lesser highways, state routes, and local streets. The three primary routes that connect NSF Dahlgren to other regions are I-95, Highway 301, and VA Route 3. Several state routes provide alternate coverage to these highways. The following is a brief description of the major highways in the study area.

- Interstate 95 (I-95) traverses the US East Coast and is a major north-south thoroughfare between the Washington, DC and Richmond corridor. The interstate lies approximately 25 miles west of NSF Dahlgren and is most directly accessed from the installation by State Route 218 to Fredericksburg. The I-95 infrastructure includes a limited-access, divided, six-lane highway and is the most direct and unimpeded form of land transportation through the region.
- US Highway 301 is a federal highway that runs through the South Atlantic States, from Delaware to Florida. In Virginia, the highway runs north-south to the east of I-95, converging with it in Richmond, VA. The road alternates between a two-lane roadway and four-lane divided highway through the area. The highway runs adjacent to NSF Dahlgren where it crosses the Maryland-Virginia state line over the Governor Harry W. Nice Memorial Bridge. The bridge currently only has two lanes and four lane highways on either side creating backups and bottlenecking. In November 2013, it was announced that a new four lane bridge will be built on the north side, running parallel to the existing bridge.
- VA Route 3 is a state highway that extends from the Town of Culpeper southeast toward Westmoreland County and ends in Mathews County. In Westmoreland County the Route is considered a Scenic Byway between Oak Grove and Montross, passing by the George Washington Birthplace National Monument and Westmoreland State Park.

3. Military Profile

Inside Chapter 3 . . .

Introduction

This chapter provides an overview of the military profile including a brief summary of the history and current operations at Naval Support Facility (NSF) Dahlgren within the Joint Land Use Study (JLUS) Study Area.

Identifying and describing the various activities performed on the military installation provides valuable insight into the importance of NSF Dahlgren as a strategic national defense asset. This information enables stakeholders to make informed decisions about the future development of NSF Dahlgren and the economic growth of the communities within significant proximity of the installation, which could potentially impact the existence and future role of the facility.

NSF Dahlgren Economic Benefit

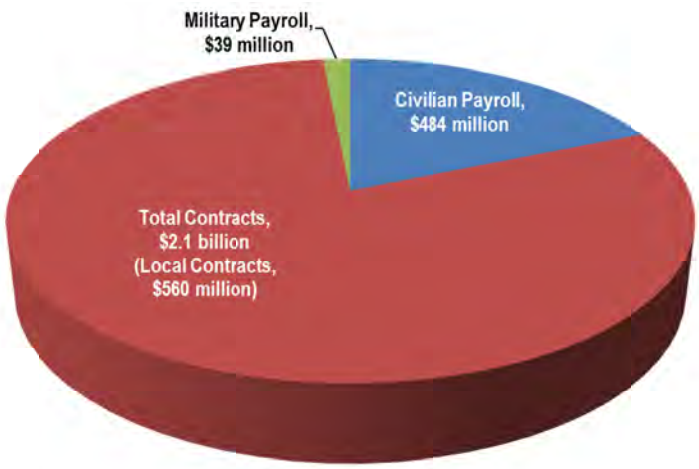
NSF Dahlgren is located in King George County, Virginia, along the Potomac River. In addition to its strategic military value, NSF Dahlgren contributes to both the local and regional economy, serving as one of the largest employers in King George County and the surrounding area. For fiscal year 2013, commands within NSF Dahlgren generated over $1 billion in local economic benefit.

As indicated in Figure 3-1, this revenue included a combined payroll for federal civilian employees and military personnel of more than $523 million and approximately $560 million in defense contract capital, which was further allocated to companies in the local region, encompassing portions of southern Maryland and Virginia's Planning District 16, which includes Fredericksburg and Stafford, Spotsylvania, Caroline, and King George Counties.

Employment at the installation totaled over 7,600 personnel as of January 2014. The bulk of the workforce consists of 4,703 federal civilian employees working for seven different major military commands and multiple supporting organizations located on the installation. An additional 422 military personnel were stationed at the installation under permanent duty status. The remaining employees consisted of over 2,500 defense contractors.

Source: 2014 Profile- Naval Support Facility Dahlgren

Figure 3-1. Economic Benefit of NSF Dahlgren



Dahlgren Naval Base History

The Dahlgren Naval Base was founded in June 1918 as a remote extension of the Indian Head Proving Ground in Maryland for the testing of naval weaponry. Originally named the Lower Station of the Naval Powder Factory at Indian Head, the installation was later renamed Naval Proving Ground Dahlgren after Rear Admiral John Adolphus Dahlgren, who is considered the father of American naval ordnance. The original site for the installation was a remote, undeveloped area that provided the Navy with a long-distance testing range down the Potomac River and ample land for future expansion and development. The site encompassed less than 1,000 acres between Upper Machodoc Creek and Lower Cedar Point Light on the Potomac River. This site along the Potomac River afforded a 51-mile long ballistic testing range used to proof and test every major naval gun and ammunition for use during World War I.

After World War II, the impact of new technology on naval weapons systems shifted emphasis from traditional proof and testing functions of weaponry to focus on research and development of weapon systems. Electronic firing and targeting systems and simulating the effects of electromagnetic radiation from radio and radar transmitters on ordnance became the priority of weapons research at what became known as the Naval Weapons Laboratory and later the Naval Surface Warfare Center Dahlgren Division.

Since 1960, NSWCDD has been heavily involved with testing and utilizing satellite geodesy – a branch of applied mathematics intended on determining geographical size, shape, and position of Earth. Roughly a decade after initial use of geodesy, NSWCDD developed new ammunition and gun systems to provide increased safety, accuracy, and range of naval guns in the 1970s. In November 2005, the installation was placed under the management of Naval Support Activity South Potomac (NSASP), a regional command of Naval District Washington (NDW), under which support continues to lead development in new Navy firing / targeting software for ballistic missiles use. Today, NSF Dahlgren has expanded to an area over 4,300 acres with the addition of the Potomac River Test Range (PRTR) consisting of over 169 square nautical miles (nm).

Source: 2013 Profile- Naval Support Facility Dahlgren

Installation Setting

NSF Dahlgren encompasses over 4,300 acres of land split between two tracts in King George County, Virginia, separated by Upper Machodoc Creek. The larger of the two tracts, referred to as Mainside, consists of approximately 2,680 acres bounded by the community of Dahlgren to the west, Upper Machodoc Creek to the south, the Potomac River to the east, and US Route 301 to the north. The smaller tract, known as the Pumpkin Neck Annex or the Explosives Experimental Area (EEA), is a 1,631-acre peninsula located across Upper Machodoc Creek from Mainside. These areas are identified in Figure 3-2.

Approximately 40 percent of Mainside is composed of residential and developed areas, located in the southern portion. The northern and western portions of Mainside contain large blocks of forest, an airfield, and designated locations where ordnance is handled, tested, and stored in a secure testing environment. Facilities at Mainside are used primarily for administration, research and development, housing, and community support activities.

There are five land ranges located along the eastern edge of Mainside that are part of the PRTR. From north to south, these ranges consist of the Missile Test Range, Terminal Range, Main Range, Anti-Aircraft (AA) Fuze Range, and Machine Gun Range. These ranges are described in more detail later in this chapter under the heading "Military Operations."

The EEA is located to the south of Machodoc Creek on Tetotum Flats. It is primarily used for research, development, testing, and evaluation (RDT&E) as well as the storage of ammunition and explosives (A&E). The site is mostly undeveloped and wooded to provide a safe environment for the testing of explosives. Approximately eight percent of the EEA consists of developed areas that provide support for testing activities. Two large open field test areas are located in the center of the EEA, which are primarily used for the testing of A&E.

Source: NSF Dahlgren Master Plan, September 2011; Public Health Assessment Naval Support Facility NSF Dahlgren, 2006

Military Mission and Commands

NSF Dahlgren is one of two installations under the NSASP, the other being NSF Indian Head in Maryland. Naval District Washington is the broader regional entity whose mission is to strengthen the operational readiness of its shore installations, provide ceremonial support for Navy and national leadership, and support the Joint Force Headquarters National Capital Region. Other NDW regional installations include Naval Air Station Patuxent River, Naval Support Activity (NSA) Annapolis, NSA South Potomac, NSA Bethesda, Joint Base Anacostia-Bolling, and NSA Washington.

NSF Dahlgren Mission Area

The Mission Area consists of 1,593 acres adjacent to, but not designated as part of, the PRTR. This area supports numerous outdoor RDT&E activities but excludes activities such as destructive ordnance testing, which is allowed on ranges including the PRTR and EEA. Facilities in this area include the NSF Dahlgren Airfield, NSWCDD facilities, the Maginot Open Air Test Site (MOATS), the Chemical/Biological Defense (CBD) Facility, and the Electromagnetic Environmental Effects (E3) facilities (ground planes, airfield hangars, and the runways).

Naval Support Activity South Potomac Mission

Naval Support Activity South Potomac's (NSASP) mission at NSF Dahlgren is to sustain combat readiness through effective and efficient management and support. The NSASP serves as host command and provides the following support functions at NSF Dahlgren:

- Public safety (e.g., base access, visitor pass offices, physical security, law enforcement, and fire department facilities support).
- Facility support (e.g., infrastructure management for storage buildings, equipment shelters, and maintenance shops).
- Fleet and Family Readiness Programs (e.g., morale, welfare, and recreation facilities providing child care, physical training, and retail services).

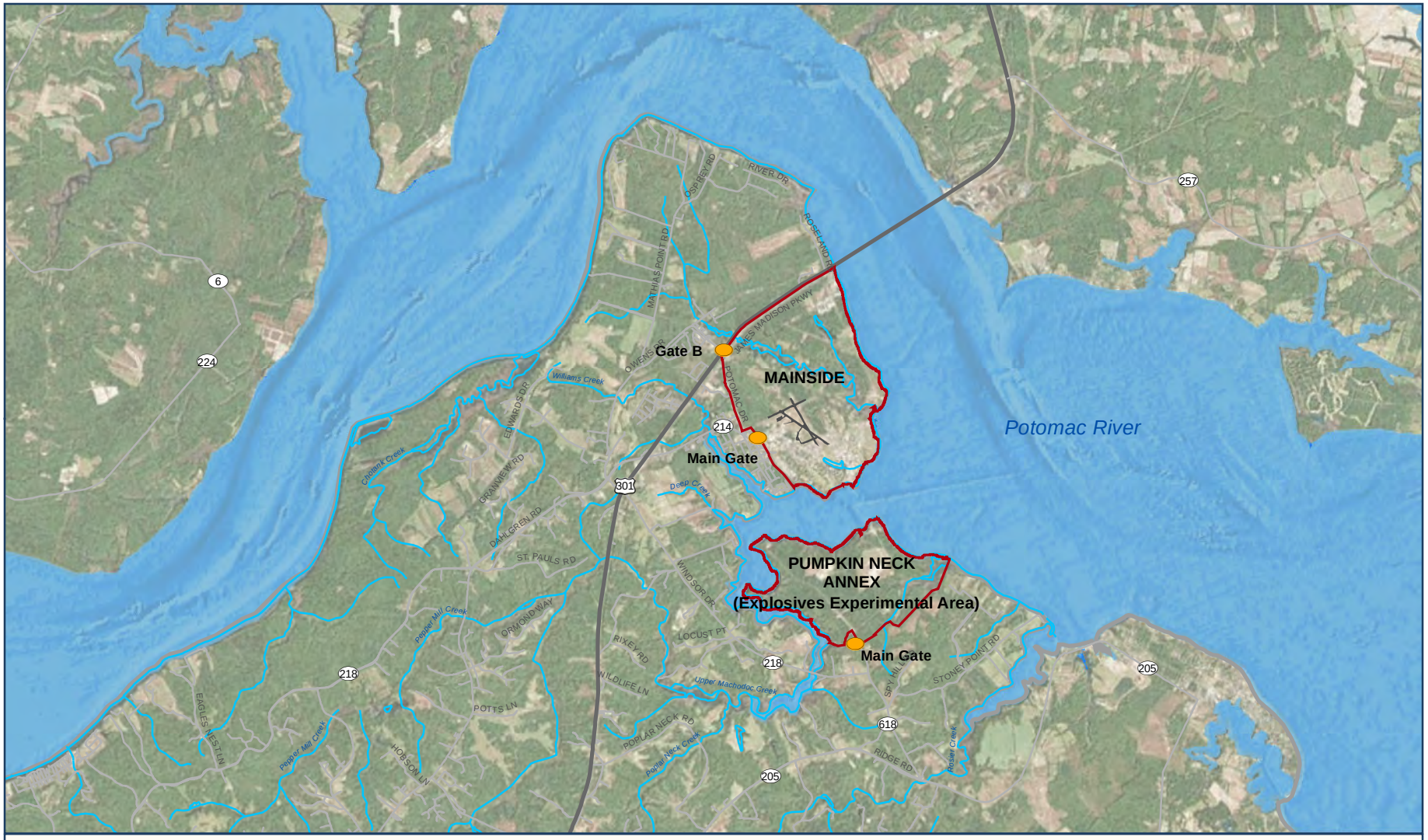


Figure 3-2: Mainside and Pumpkin Neck Annex

Fig3-2_NSF_Dahlgren_Site_20141015a_JKC.pdf

- Public affairs (e.g., community relations, public information, and base-wide communication).
- Environmental compliance and waste management (e.g., supporting hazardous materials storage facilities and environmental office spaces).

Supported Commands

NSF Dahlgren is home to supported commands including the NSWCDD, Navy Air and Missile Defense Command, Aegis Ballistic Missile Defense (BMD), the Center for Surface Combat Systems (CSCS), the Aegis Training and Readiness Center (ATRC), the Joint Warfare Analysis Center (JWAC), and the US Air Force 614th Air and Space Operations Center, Detachment 1.

Naval Surface Warfare Center Dahlgren Division

The NSWCDD is the premier naval scientific and engineering institution and the largest mission-oriented supported command at NSF Dahlgren. Its mission is to provide RDT&E for weapons, combat, and warfare systems for the Navy, Joint Forces, and the nation. The NSWCDD also provides systems engineering, including systems integration and certification for weapons, and executes other responsibilities as assigned by the Commander, Naval Surface Warfare Center. Their vision is to be the Navy's leading warfare system architect and system engineer, recognized as the technical leader in delivering innovative, affordable, and effective solutions for the Navy, Joint Forces, and the nation.

NSF Dahlgren's largest command is NSWCDD, which provides scientific and responsive research for a number of Navy forces. NSWCDD's mission statement is to conduct research, development, testing, evaluation, analysis, systems engineering, integration, and certification of complex naval surface warfare systems. NSWCDD also maintains system integration and certification for weapons, combat systems, and warfare systems. NSWCDD also executes other responsibilities as assigned by the headquarters Commander, Naval Surface Warfare Center.

NSWCDD's ability to provide integrated research and testing support to naval commands at the facility ensures greater homeland and force protection. The vast array of programs at the facility makes it a unique and vital tool for the Armed Forces.

Military safety testing at NSWCDD helps to develop weapons stability under various conditions. Before approved use, guns and ammunition are inspected at NSF Dahlgren to ensure proper field function. Measurement tools such as drop test facilities and electromagnetic energy testing allow engineers to ensure the safety of projectiles and explosives.

NSWCDD's integrated warfare systems allow for the synthesis of communications and weapons systems for all branches of the Armed Forces. Dahlgren's Aegis Ballistic Missile Defense system is a highly integrated ship combat system involving cruiser and destroyer ships. The system improves efficiency and safety of military operations through technological integration.

The sensors and directed energy testing at NSF Dahlgren provides research for a critical warfare tool. Sensors and directed energy refers to the testing of passive sensors that pick up signals from targets without emitting any potentially detectable energy. Examples of this include nighttime vision devices that amplify existing light, infrared detectors that sense heat emitted by targets, and surveillance television cameras. Active sensors, such as radar, send out their own signals to identify and track a given target. The RDT&E of directed energy devices is highly researched and tested at Dahlgren.

Some important uses of sensors include all-weather day and night surveillance, precision targeting, detection and tracking of moving targets such as cruise missiles, and detection of mines and submarines.

Research for both active and passive sensors enables the use of lasers and radar as weapons. This dynamic testing at Dahlgren provides a vital tool for homeland protection by enabling the military to adapt and respond to threats.

Source: NAVSEA Warfare Centers Strategic Plan, 2008

Navy Air and Missile Defense Command

Navy Air and Missile Defense Command was established in 2009 and is the Navy's primary authority and lead organization for naval, joint, and coalition integrated air and missile defense matters. This command assesses, integrates, and synchronizes Navy integrated air and missile defense efforts across all levels of operation and provides integrated air and missile defense operational mission support to the US Navy

Aegis Ballistic Missile Defense

The Aegis BMD is the Navy's element of the Department of Defense (DOD) Missile Defense Agency and a field activity of the Naval Sea System Command. The program office is responsible for Aegis BMD program and system integration; shipboard installation; and testing and certification for engagement capability against short- and medium-range ballistic missiles. There are currently 21 Aegis BMD combatants deployed in the US Navy. The Aegis BMD upgraded ships have integrated planning, detection, control, engagement, and damage assessment capacities for ballistic missile engagement. Additionally, Aegis BMD-equipped ships provide surveillance and tracking of intercontinental ballistic missiles and work to provide advance warning for the defense of the nation, deployed US forces, and allies.

Center for Surface Combat Systems

The CSCS was established at Dahlgren in September 2004 to develop and deliver surface ship combat systems training to achieve surface warfare superiority. The CSCS uses a mix of blended learning comprising instructor-led classes, hands-on labs, simulation, and computer-based training.

The CSCS conducts training for nine enlisted ratings: Fire Controlmen, Electronic Technicians, Interior Communications, Sonar Technician (surface), Gunner's Mates, Minemen, Operations Specialists, Boatswain's Mates, and Quartermasters. The CSCS also trains surface warfare officers in skills required to tactically operate and employ Aegis, Ship Self Defense System, and Tomahawk weapon system equipped ships.

The command also provides training to many international students, enabling them to develop ready teams capable of operations that maintain and expertly employ surface combatants.

Aegis Training and Readiness Center

The ATRC is a component of the CSCS. Its mission is to provide enlisted personnel with the knowledge, ability, and skill to operate and maintain the Aegis Combat System through timely, effective, and integrated training, and to provide officers the knowledge, ability, and skill to operate, employ, and assess the readiness of the Aegis and Ship Self Defense System aboard surface warships. The ATRC offers technical training courses specifically designed to prepare individuals to serve in a combat system role and support the shipboard technologies implemented by Aegis BMD.

Joint Warfare Analysis Center

The JWAC provides combatant commands, Joint Staff, and other customers with precise technical solutions for implementing national security and military strategies. The JWAC is a joint subordinate command of US Strategic Command based in Omaha, Nebraska, and serves as a premier science and engineering agency contributing to national security. The JWAC develops and adapts modeling and simulation technologies for analysis, computation, and presentation of response options to combatant commanders, the Joint Staff, and other customers through partnerships with DOD and industry technology centers.

US Air Force 614th Air and Space Operations Center, Detachment 1

The 614th Air and Space Operations Center, Detachment 1, is responsible for providing space command and control and space superiority for US forces as well as space situational awareness to government and civilian customers. It operates as the Distributed Space Command and Control-Dahlgren and provides tasking to the space surveillance network (a worldwide network of 31 space surveillance sensors comprising both military and civilian radar and optical telescopes on high-priority satellites), processes space events (launches, re-entries, de-orbits, breakups, maneuvers, etc.), and works directly with the National Aeronautics and

Space Administration to ensure the safety of the International Space Station crew.

The command also processes laser clearinghouse requests to ensure laser test fires don't interfere with orbital assets. Collocated and working hand-in-hand with Naval Network Warfare Command Space Operations, Distributed Space Command and Control-Dahlgren compliments the Department of the Navy's Satellite Vulnerability Program by providing near real-time notification of potentially hostile space-based reconnaissance systems in support of global naval operations and provides space situational awareness products and services in support of US Strategic Command.

Sources: Readiness and Environmental Protection Integrations; NSF Dahlgren Master Plan, September 2011

Military Operations

NSF Dahlgren hosts nearly a dozen tenants and supporting organizations including an RDT&E facility which tests a variety of weapons systems. Mission activities at NSF Dahlgren include the use and detonation of ordnance, high-powered electromagnetic (EM) energy systems, high-power lasers, and chemical / biological simulants. The use and testing of these systems helps to ensure their safe operation for the users, while developing and improving better delivery systems and accuracy of weapons.

Larger scale operations are conducted at NSF Dahlgren, such as surface ship combat systems and ship weapons systems and firing capabilities. Force-level warfare systems are also conducted to simulate force-level, battle group-level, and theater-level scenarios. These types of operations help the Navy to assess warfare systems requirements, warfare systems engineering, and mission assurance. Different types of mission activities occur in different locations in and around NSF Dahlgren. The various ranges where specific operations occur are described in Table 3-1.

Source: NAVSEA Range Condition Assessment Report, 2010

Table 3-1. NSF Dahlgren Operational Areas

Area	Operations	
Mainside		
NSF Dahlgren Airfield	**Assets:** ■ Heliport ■ Class A Runway 16/34 (closed to fixed-wing aircraft)	**Primary Operations:** ■ Local helicopter flight services ■ Personnel transport ■ Occasional marine aircraft training
NSWCDD Mission Area	**Assets:** ■ Maginot Open Air Test Site ■ Chemical / Biological Defense Facility ■ Electromagnetic Environmental Effects facilities	**Primary Operations:** ■ RDT&E activities ■ Airfield operations

Area	Operations	
Potomac River Test Range Complex. *There are five land ranges that encompass a total of 725 acres. The PRTR also includes 169 square nm for testing operations.*		
Main Range	**Assets:** ■ Search and Track Sensor Site ■ Large caliber gun systems ■ Multiple gun emplacements ■ Proof-firing gun-mount oscillating assemblies and gun barrels ■ Radar systems ■ Networked connectivity	**Primary Operations:** ■ Systems integration and testing network connections to shipboard combat systems ■ Gunfire control ■ Range scanning ■ Unmanned aerial vehicle control ■ Projectile firing 20-406mm (0.8-16 inch)
Anti-Aircraft Fuze Range	**Assets:** ■ Adjacency to PRTR water areas allows for over-the-water testing of fuzes	**Primary Operations:** ■ Over-the-water fuze tests ■ Barrel wear and heating tests ■ Large caliber munitions tests ■ Projective testing and design evaluation ■ Water-surface burst data
Machine Gun Range	**Assets:** ■ Four indoor firing bays ■ Two indoor / outdoor bays ■ Outdoor test area ■ Navy Directed Energy Center ■ Data recording capability	**Primary Operations:** ■ Smaller ammunition testing (40mm or smaller) ■ Protective materials and armor testing and penetration levels
Terminal Range	**Assets:** ■ Projective recovery system to analyze projectiles after firing ■ UAV Runway	**Primary Operations:** ■ Weapons systems, components, and other ordnance (specifically experimental) material testing ■ Ordnance production testing ■ High-quantity testing ■ Explosives, ballistic evaluation of armor plate, and projectile penetration testing ■ Projectile firing 76.2–406.4 mm (3-16 inch) ■ Electromagnetic Rail gun testing

Area	Operations	
Missile Test Range	**Assets:** ■ Electromagnetic Launch Facility ■ Explosive Ordnance Disposal (EOD) training range ■ Suspended targets ■ Portable facilities ■ Analysis equipment	**Primary Operations:** ■ Overland tests ■ Evaluation of vehicles and special weapon components against targets ■ EOD detachment training
Explosives Experimental Area. *The EEA supports multiple performance tests, including lethality, safety, and insensitive-munitions testing on full-scale weapons systems and components containing explosives, propellants, and inert materials. It also supports RDT&E of lasers, EM energy, and chemical / biological stimulants. The EEA contains two ranges.*		
Churchill Range	**Assets:** ■ 125 acres ■ 1,000 pound net explosive weight capacity ■ Resource Conservation and Recovery Act permitted open burn / open detonation units ■ UAV Runway	**Primary Operations:** ■ Fast cook-off testing (a cook-off test is a controlled test to determine if or how soon a component, device, or system will malfunction due to exposure to heat, in this case, it tests when ammunition is likely to explode prematurely due to heat in the surrounding environment. A fast cook-off is caused by fire.) ■ Slow cook-off testing (A slow cook-off is caused by a sustained thermal event less intense than fire.) ■ Destructive and non-destructive testing ■ Bullet impact ■ Arena testing ■ Blast testing ■ Specialized testing
Harris Range	**Assets:** ■ 50 acres ■ 600 pound net explosive weight capacity	**Primary Operations:** ■ Slow cook-off ■ Destructive and non-destructive testing ■ Fragment-impact testing ■ Arena testing ■ 40-foot drop testing ■ Full-spectrum shipboard shock testing ■ Specialized testing ■ Explosive and non-explosive testing capacity ■ Explosive and non-explosive testing capacity ■ Fragment Impact testing

NSF Dahlgren Mission Footprint

Mission and training activities at NSF Dahlgren generate a number of impacts that can affect the health, safety, and overall quality of life in the surrounding community. Examples of these mission impacts include noise and vibration overhead from weapons testing or the risk of a ship or aircraft accident. Conversely, the military mission is susceptible to hazards created by certain nearby civilian activities and land use development that may obstruct air space, waterways, locate noise sensitive uses in high noise zones, or allow for the gathering large numbers of people in areas deemed vulnerable to potential safety incidents.

A military mission footprint is described as the area outside the installation boundaries on which military activities can have an impact or be impacted by civilian uses. Several elements or mission profiles comprise the mission footprint that extends outside NSF Dahlgren's boundaries. The following outlines the different elements or mission profiles that contribute to the NSF Dahlgren mission footprint in support of the NSWCDD Mission:

- Potomac River Test Range Complex
    - Water Ranges
    - Special Use Airspace
    - Ordnance Activities
    - Unmanned Systems
    - Manned Vehicles
    - Noise Contours
- Explosives Experimental Area
    - Noise Contours
    - Explosive Safety Quantity Distance (ESQD) Arcs
- NSF Dahlgren Airfield
    - Safety Zones
    - Noise Contours
    - Imaginary Surfaces

Potomac River Test Range Complex

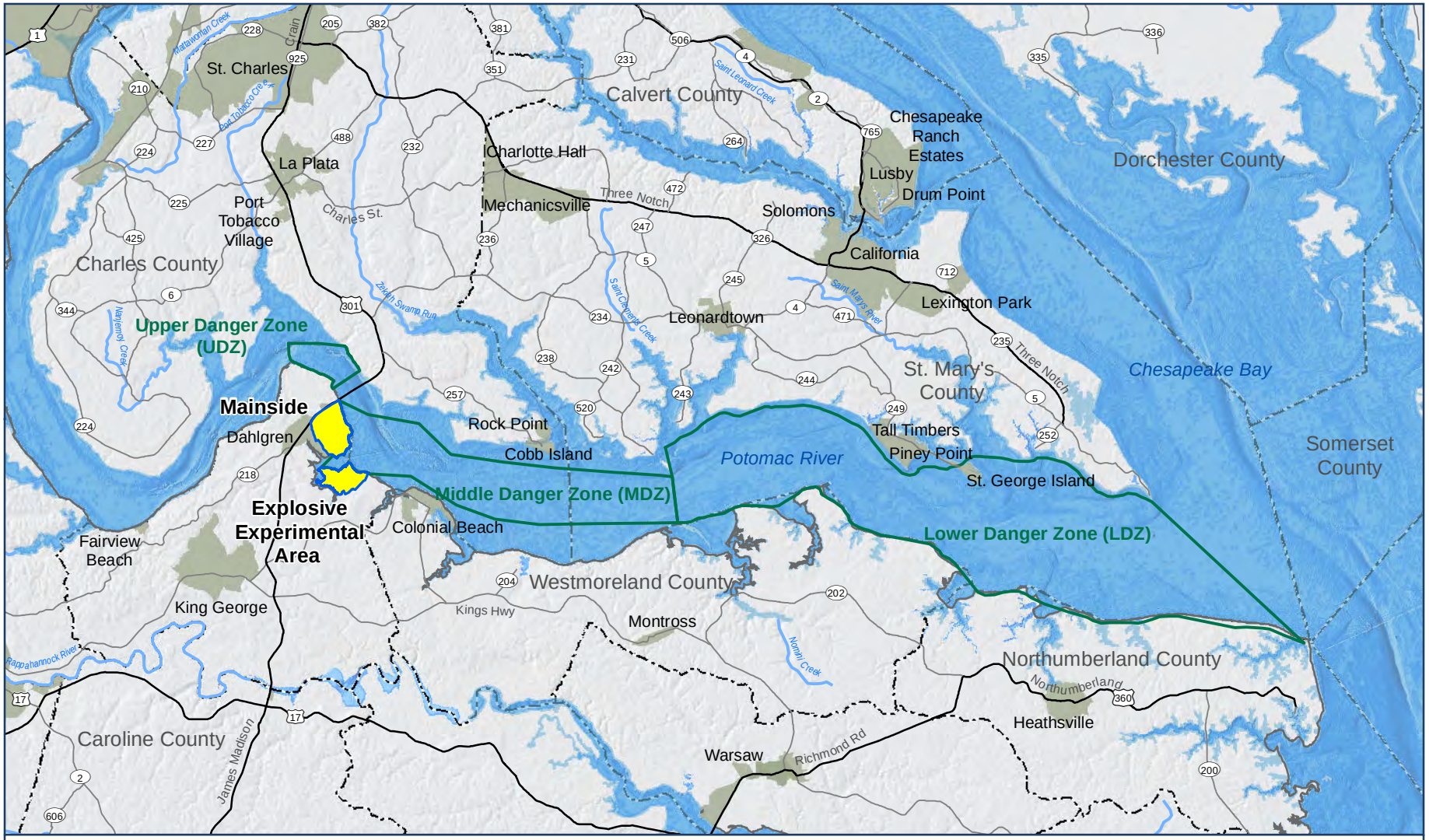
The PRTR Complex managed by NSWCDD, consists of 715 acres of land and 169 square nm of water test areas that support RDT&E of warfare systems integration, ordnance, lasers, EM energy, sensors, unmanned systems, and chemical simulants. The PRTR allows for the safe conduct of testing in a realistic, controlled environment, effectively serving as a "ship on shore" space to collect real-time data from a number of instrument stations.

Water Ranges

The water portion of the range is 51 nautical miles (nm) long, covers 169 square nm, and is divided into three danger zones - the upper danger zone (UDZ), middle danger zone (MDZ) and lower danger zone (LDZ). They are each designated on nautical charts and divided as such for the purposes of managing the degree of waterway restriction required to allow for safe conduct of military operations. These zones denote geographic location only and are not indicative of varying levels of safety.

Certain types of tests, such as those involving large caliber weapons firing, require that all or most of the danger zone be restricted; however, other tests, such as the use of lasers across the entrance to Upper Machodoc Creek, require that only part of the danger zone be restricted. During these times, range boats patrol the area to keep unauthorized watercraft out of the danger zone. The boats fly red warning flags to alert nearby watercraft users that the ranges are in use.

To also ensure safe operations within the danger zones, NSWCDD employs a series of range stations to ensure public safety and monitor testing. Many of the stations contain instruments for measuring and reporting noise generated by testing. These instruments are also used by NSWCDD to assess real-time weather and environmental conditions prior to testing to determine whether tests can proceed or need to be postponed based on exceeding predicted sound limits. The danger zones and range stations are identified in Figure 3-3.



Source: Dahlgren NSF, 2013

Fig3-3_NSF_Dahlgren_PRTR_20140630_JKC.pdf

Figure 3-3: Potomac River Test Range Danger Zones

The MDZ is the most heavily used and so experiences the greatest frequency of restricted access. The MDZ is 2.6 nm wide, 15.4 nm long, and covers 38.5 square nm. The upper and central portions of the MDZ experience the highest intensity of use throughout the PRTR. Generally, the central part of the MDZ and the waters near the shore of Mainside experience the highest number of large caliber projectiles.

Even when access to most of the MDZ is restricted for testing, small civilian watercraft can move up and down the river along the Maryland shoreline, immediately outside the PRTR boundary. Tests that are currently conducted in the LDZ include sensor detection tests; however, this area is projected for use of long range firing in the future. Hazardous operations are generally limited to weekdays between the hours of 8:00 am and 5:00 pm for all three danger zones.

Source: NSWCDD RDT&E Final Environmental Impact Statement, 2013

The PRTR includes leased range stations that are strategically placed along the Potomac River. Many of these range stations are located on private and federal land that is leased to NSWCDD. The range stations are used to collect key test and evaluation information and are vital in supporting safe operations during ordnance testing. Also, many of the range stations have sound monitoring equipment for collecting sound data to assist in sound management, improve real time sound monitoring, and identify other factors associated with sound propagation.

When evaluating performances for radar and electro-optical tracking systems, water testing is important to ensure the systems can function on both land and water. In cases where conditions can vary, the over-water range is able to provide tracker and sensor detection with low over-water targets. The PRTR has a comprehensive system that helps measure all results from the tests accurately and the PRTR serves the range as a safety buffer for all the on-land tests.

Source: NAVSEA Warfare Centers, 2008; Title 33 of the Code of Federal Regulations

Special Use Airspace

While NSF Dahlgren is not designated as an air station and accommodates minimal flight activity, Special Use Airspace (SUA) areas have been established by the Federal Aviation Administration (FAA) for the purpose of preventing hazards to aircraft from NSWCDD's RDT&E activities. The SUAs restrict airspace to air traffic over a portion of both the PRTR and the EEA. In an effort to prevent any hazard, the maximum hazards above the PRTR and EEA are 60,000 feet and 7,000 feet, respectively. The SUA restrictions over the PRTR and EEA are in effect from 8:00 am to 5:00 pm every weekday, excluding holidays.

Flights by non-military aircraft in the SUA are restricted during testing for safety compatibility measures. When testing is completed early or a scheduled test is cancelled, the airspace is returned to the control of the FAA for normal civilian air traffic use.

There are five Restricted Airspaces comprising the SUA areas associated with NSF Dahlgren as illustrated in Figure 3-4. Restricted Airspace R-6611A and R-6611B share the same footprint over the PRTR. R-6611A has a maximum altitude of 40,000 feet, while R-6611B is directly above R-6611A and has an altitude between 40,000 and 60,000 feet.

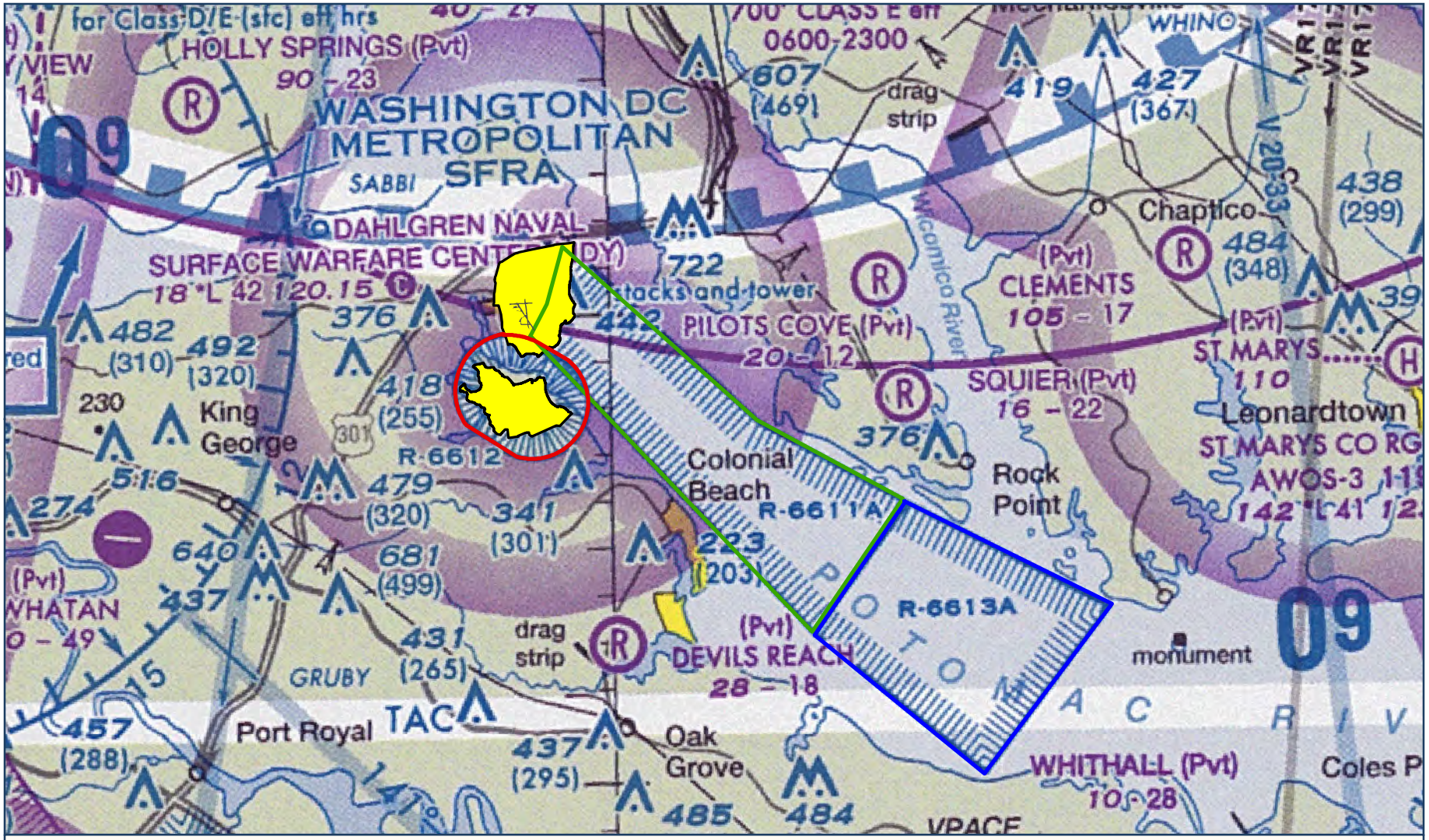
Restricted Airspace R-6612 lies directly over the EEA and extends to an altitude of 7,000 feet.

Restricted Airspace R-6613A and R-6613B share the same footprint over the PRTR. R-6613A has a maximum altitude of 40,000 feet, while R-6613B is directly above R-6613A and has an altitude between 40,000 and 60,000 feet.

Ordnance Systems

When RDT&E events are scheduled, the river range in use is closed to vessel traffic. The range operations center works with vessel operators to minimize delays by allowing transit during pauses in operations.

Activities involving the use of large caliber guns at NSF Dahlgren mainly fire inert (non-explosive) projectiles; however, the firing of live (explosive) projectiles into the Potomac River is also conducted. Live projectiles produce noise both at the gun when they are discharged and at the target downriver when they detonate. Inert projectiles only produce noticeable noise at the gun when they are discharged.



Legend

Restricted Airspace NSF Dahlgren

R-6611A/B

R-6612

R-6613A/B

0 2.5 5 Miles

Source: FAA Sectionals, 2014

Figure 3-4: Special Use Airspace

Fig3-4_NSF_Dahlgren_Airspace_20141015a_JKC.pdf

There is no set standard for labeling ammunition size, so the caliber of ammunition can be labeled in both millimeters (mm) and inches (in); often determined by the manufacturer. For the purposes of consistency, the size of ammunition will be labelled in mm (inches) throughout this JLUS. The guns range in caliber from more than 20mm (0.8 inches) up to 203mm (8 inches).

Large Caliber Arms

The largest guns currently fired at NSF Dahlgren are 155 mm (6.1 inch) and 203 mm (8 inch) howitzers used by the Marine Corps and Army. Infrequently, the 155 mm gun is fired in support of the fuze and projectile testing. The 155 mm gun is generally fired into the projectile catchment facility located on the Terminal Range.

The more frequently fired guns discharge 127 mm (5 inch) caliber rounds. This gun is found on ships, and has a maximum firing rate of 20 rounds per minute and a range of 26,000 yards (approximately 13 nautical miles). The newer, longer range versions of this gun have a maximum range of 30,000 yards (approximately 15 nautical miles).

The number of projectiles NSWCDD fires annually with the large caliber guns on and from the land ranges of the PRTR Complex varies based on the type of test being conducted.

Small Caliber Arms

Small arms are defined as having a projectile diameter of less than or equal to 20 mm (0.8 inches). The firing of these guns can take place on any of the ranges, but primarily takes place on the Machine Gun Range, AA Fuze Range, and Main Range. In addition to the small arms operations, the Machine Gun Range is used to test the penetration of light armor materials and of primers (caps or tubes containing a small amount of explosive used to detonate the main explosive charge of a firearm). Active gun mounts can be found on a wide variety of small caliber handguns, machine guns, and rifles. A gun projectile that is smaller than or equal to 20 mm (0.8 inches) is referred to as a bullet, and roughly 6,000 bullets are fired outdoors on the ranges annually.

Unmanned Systems

Various types of unmanned systems such as self-propelled aerial, terrestrial, sea-borne, or submersible platforms that operate without a human being positioned on or within the vehicle / platform are used to perform various components of the range operations.

Unmanned Aerial Vehicles

NSWCDD uses unmanned aerial vehicles (UAVs) for various RDT&E functions and are generally used as a platform for weapons-system integration. The UAVs can be used for targeting, reconnaissance, surveillance, and communications relay. These vehicles can also carry lasers, radar, and ordnance. The UAVs range in size from a micro air vehicle, weighing less than one pound, to a full-sized aircraft. The UAVs used by NSWCDD are on a smaller scale, from micro air vehicles, that can be carried by personnel and assembled and launched by hand, to the Tiger Shark with a wingspan range of 17 to 21 feet and a weight of 400 pounds. There are two UAV runways located at NSF Dahlgren on the Terminal and Churchill Ranges. These runways are dedicated to UAV operations and operating aircraft are only permitted to fly within the SUA. Other operating restrictions include an altitude of 2,000 to 3,000 feet although an altitude of 5,000 feet is allowed in select areas.

Unmanned Surface Vehicles

An unmanned surface vehicle (USV) is an unmanned boat or amphibious craft that can travel on the surface of the water. Some of the watercraft that the NSWCDD maintains at NSF Dahlgren can be used as USVs. Operations involving USVs include testing their ability to be detected and scanned by radar, their reaction to counter-terrorism measures, or the ability to disable their equipment, stop, or destroy them. The USVs may be used as one component in tests of integrated warfare systems.

Unmanned Ground Vehicles

Unmanned ground vehicles (UGVs) refer to vehicles that travel on the land surface and are operated autonomously or through remote control. The NSWCDD uses UGVs as platforms for sensors and weapons on the land ranges and the Mission Area. The UGVs are used to gain information about

an area that may be dangerous for personnel to access and relay the information back remotely. Some UGVs can be fitted with weaponry to remotely fire on targets in unsafe areas.

Manned Vehicles

Manned ground, water, and air vehicle operations occur at NSF Dahlgren. No manned aircraft are currently stationed at NSF Dahlgren, but occasionally access to the installation to perform testing operations may occur. Air operations at NSF Dahlgren typically involve the aircraft flying into the USV to test a sensor system either onboard the aircraft or on the ground. Fixed-wing aircraft used in RDT&E activities do not land on NSF Dahlgren's airfield, which currently is closed for fixed-wing aircraft landings. Helicopters on occasion may transport personnel and in one recent instance the US Marine Corps used the airfield for landing and take-off training.

Noise Contours

Measurements of Noise

A number of factors affect sound as it is perceived by the human ear. These include the actual level of noise, the frequencies involved, the period of exposure to the noise, and changes or fluctuations in noise levels during exposure. The most common noise frequency-weighting measurements that are related to operations at NSF Dahlgren include the following:

- **A-weighted Scale –** The human ear cannot perceive all pitches or frequencies equally; therefore, measures can be adjusted, or weighted, to compensate for the human lack of sensitivity to low-pitched and high-pitched sounds. This adjusted measurement unit is known as the A-weighted decibel. The A-weighted decibel is used to evaluate noise from transportation activities (traffic and aircraft) and from small arms firing. It is commonly expressed as an A-weighted sound exposure level.
- **C-weighted Scale –** The C-weighted scale measures more of the low-frequency components of noise than does the A-weighted scale. This unit (C-weighted decibel) is used for evaluating impulse noise and vibrations generated by heavy weapons such as artillery, mortars, and explosive charges. C-weighted noise levels are often expressed as a C-weighted sound exposure level.
- **Peak Sound Level –** The peak sound level (dBP) is a flat-weighted scale that can be used to measure noise from small arms (less than or equal to 20 mm) firing, heavy artillery, and explosives.
- **Day-Night Sound Level –** The day-night average sound level (DNL) is useful to account for the difference in response to noises that occur during sleeping hours as compared to waking hours. This indicator is defined as the average sound level in decibels during a 24-hour period, with a 10-decibel weighting (penalty) applied to nighttime sound levels. The 10-decibel nighttime weighting accounts for the fact that noises at night sound louder because of the typically quieter environmental conditions at that time.

Noise Zones

Noise impacts can be caused by various sources such as the firing of a weapon or the explosion and detonation of a projectile. The Navy considers the operational impacts on the local community by calculating the DNL. The DNL is used as a metric for evaluating the combined effects of noises from both aircraft and gun firing. To assist the communities in land use decisions, the DOD uses varying decibel noise zones to illustrate the exposure to noise associated with different activities. Noise zones are developed based on annual average noise, measured in C-Weighted Day-Night Average Levels (CDNL). A general definition of the noise zones are:

- **Noise Zone I –** Noise Zone I is an area in which DNL is lower than 62 dB CDNL for large caliber weapons. Sound attenuation is typically not required within this zone as all types of land use are generally acceptable.
- **Noise Zone II –** Noise Zone II is an area where the noise is between 62 dB CDNL and 70 dB CDNL for large caliber weapons. This zone is considered to have moderate noise exposure and requires some land use noise control.

- **Noise Zone III –** Noise Zone III is an area around the source of noise in which the DNL is greater than 70 dB CDNL for large caliber weapons. This zone is considered an area of severe noise exposure and requires the greatest degree of land use noise control. It is recommended that no noise-sensitive land uses be developed within this zone.
- **Land Use Planning Zone –** The Land Use Planning Zone includes the noise contour where noise is between 57 to 62 dB CDNL and represents an annual average that separates the Noise Zone II from the Noise Zone I. Some uses that are more noise-sensitive may be recommended to include sound attenuation if developed in this zone.

Potomac River Test Range Noise Contours

There are two types of noise resulting from range activities that add to ambient noise levels.

- **Ammunition & Explosive (A&E) Tests –** Impulse noise (sudden, short-duration, and sharp noise) occurs from small arms firing, large caliber gun firing, and explosive detonations on the EEA and PRTR range complexes.
- **Aircraft Flights –** Noise is generated from helicopters using the NSF Dahlgren airfield, aircraft brought from other installations to be used in tests, and UAVs launched from the land ranges of the PRTR Complex and the EEA Complex and flown within the SUA.

Impulse noise at NSF Dahlgren, which consists of almost instantaneous sharp sounds, is caused in part by large caliber gun and small arms firing in the PRTR but includes firing of an electromagnetic launcher. As shown on Figure 3-5, most Noise Zone III ADNL noise contours are contained within the installation and the PRTR MDZ and LDZ, and noise contours for Noise Zone II extend slightly beyond NSF Dahlgren and the MDZ over King George County and shoreline of Colonial Beach.

In addition to the standard noise contours identified using DOD guidance, composite peak noise contours that extend beyond the PRTR and over portions of King George, Westmoreland, Charles, and St. Mary's counties have been identified by NSWCDD. The peak noise contours account for events when noise levels and disturbances may be exacerbated by an increase in testing and other environmental conditions that affect the propagation of noise. The composite peak noise contours as illustrated on Figure 3-6 indicate that:

- The noise level area of 130 – 140 dBP (i.e., high risk of complaint) extends off-base over land immediately adjacent to the PRTR MDZ, such as Potomac Beach, Colonial Beach, Swan Point, Cobb Island, and Coltons Point.
- The 115 – 130 dBP exterior noise area encompasses almost all the areas along the Potomac River adjacent to the MDZ within approximately 10 miles of the river. Within this contour area, moderate noise complaints can be anticipated.

Although these composite noise contours are associated with risk of noise complaints rather than a classified noise zone associated with average noise levels, they are important to recognize as impacts resulting from both current and the potential expansion of mission to the community.

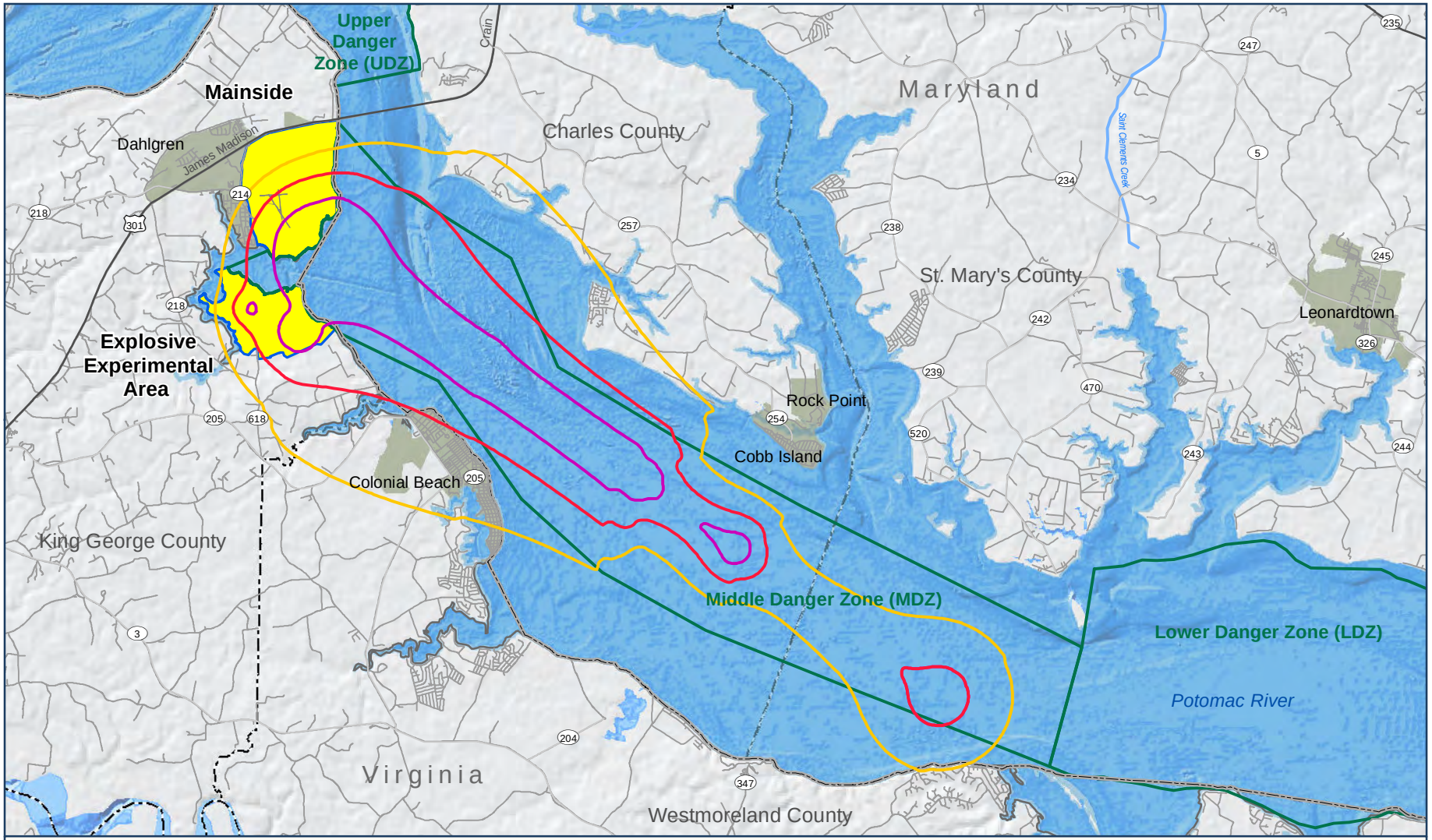
Sources: NSWCDD RDT&E Final Environmental Impact Statement, 2013 Explosive Experimental Area

Explosive Experimental Area

Noise Contours

Impulse noise at NSF Dahlgren is caused in part by explosive detonations and munitions firing on the EEA ranges. As illustrated on Figure 3-7, all average CDNL noise contours for Noise Zones II and III are contained within the individual firing ranges on the installation. Figure 3-8 shows the .50 Caliber peak noise contour extended outside of the base; however the contour does not occur in a heavily populated area.

Sources: NSWCDD RDT&E Final Environmental Impact Statement, 2013



Legend

Noise Contour
- 57 dB (Noise Zone I)
- 62 dB (Noise Zone II)
- 70 dB (Noise Zone III)

- Installation
- State/District Boundary
- County Boundary
- City/Community

- Highway
- Major Road
- Water Body
- River

0 1.5 3 Miles

Matrix Design Group

Source: Dahlgren NSF, 2013

Fig3-5_NSF_Dahlgren_Noise_20141027_JKC.pdf

Figure 3-5: Test Range Noise Contours

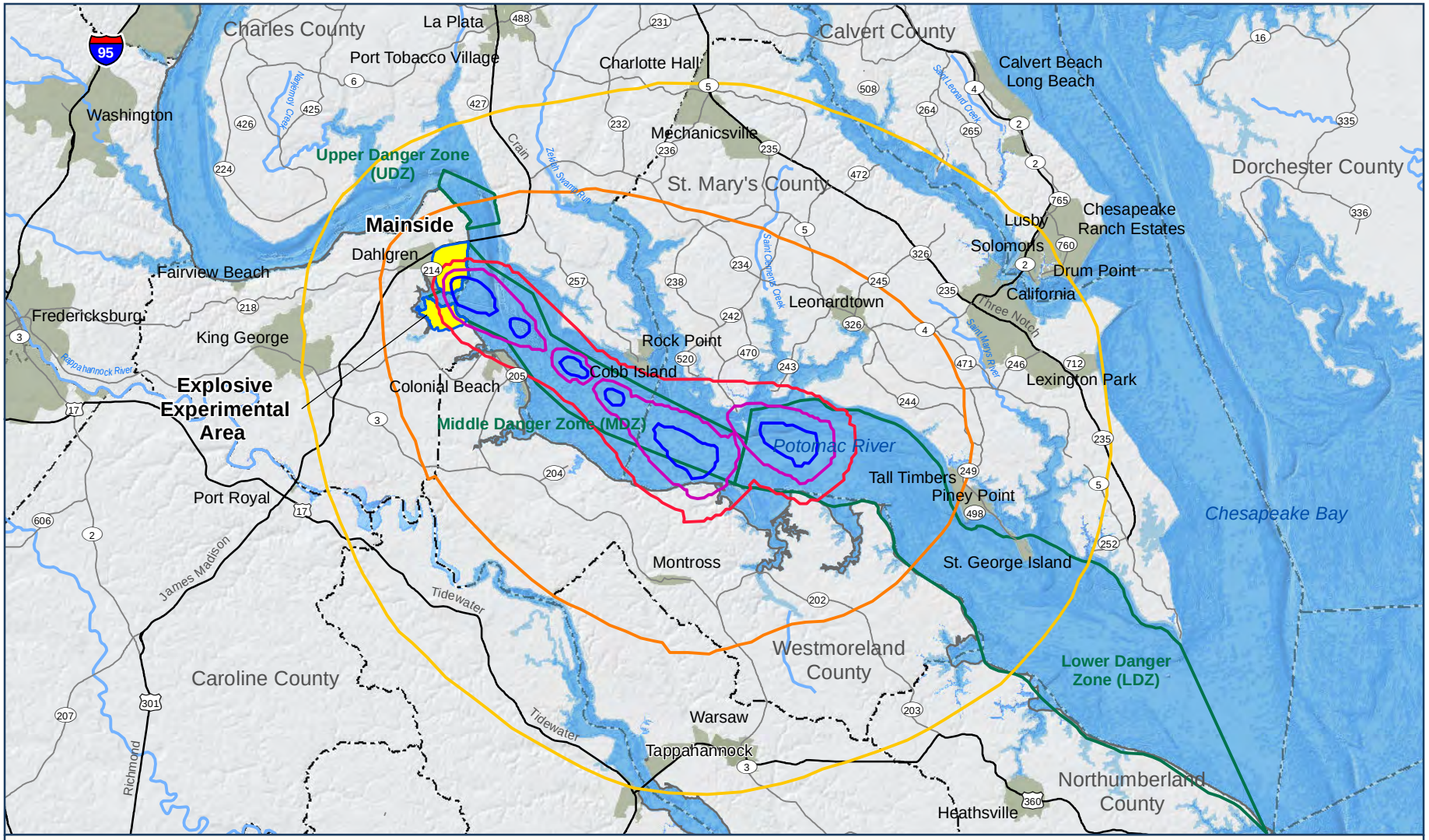
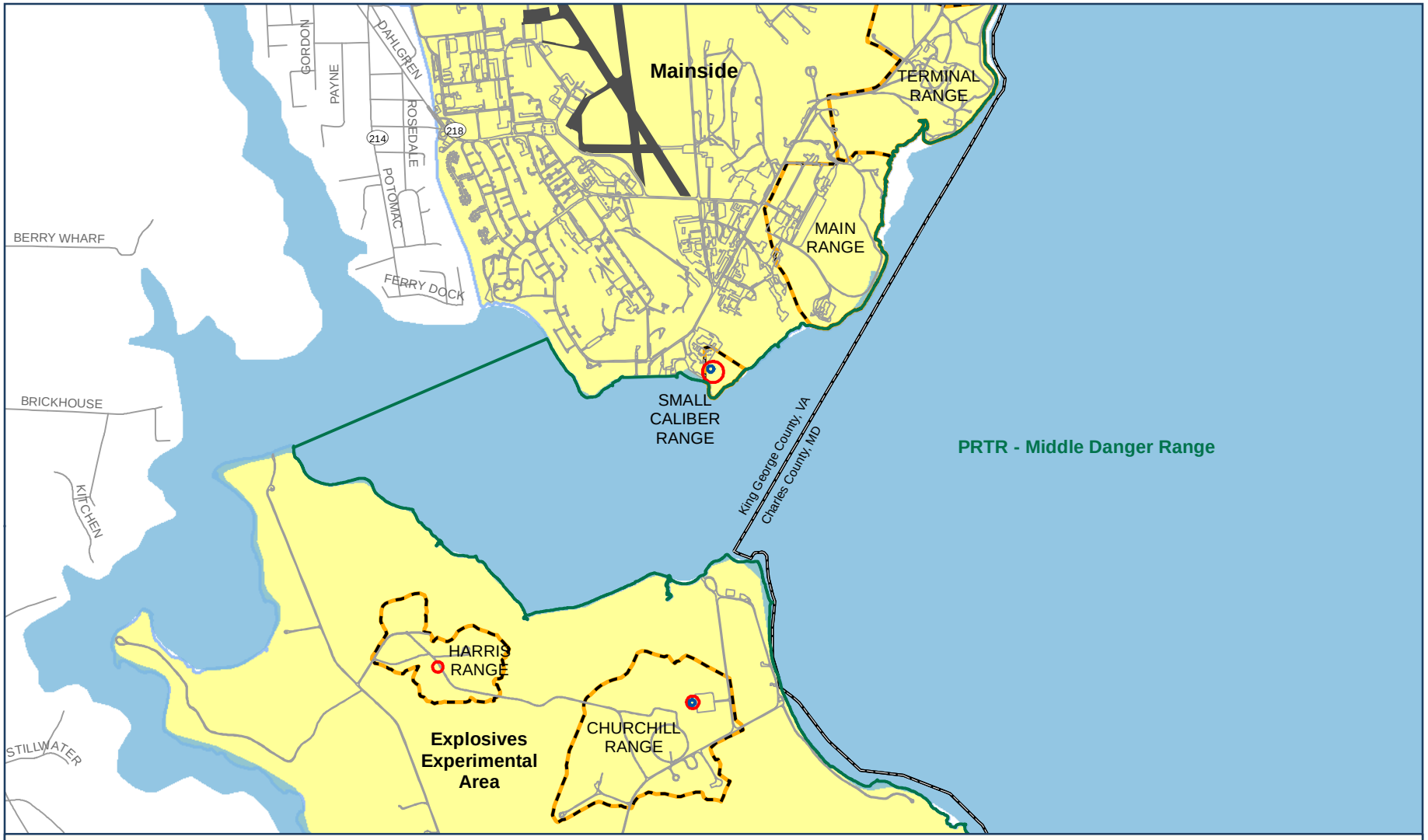


Figure 3-6: Test Range Noise Contours Composite

Source: Dahlgren NSF, 2013

Fig3-6_NSF_Dahlgren_NoiseComposite_20141014_JKC.pdf

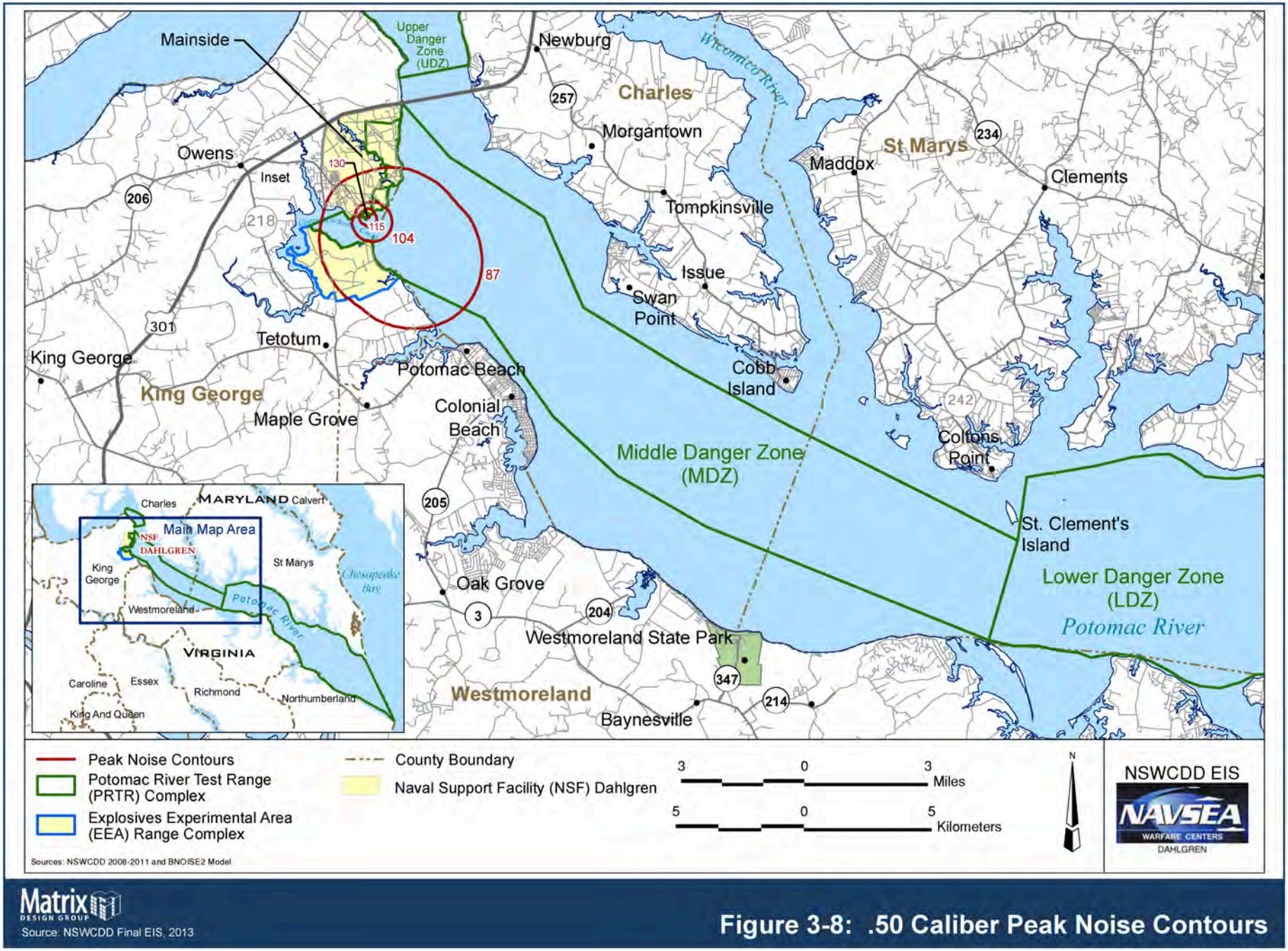


Matrix DESIGN GROUP

Figure 3-7: Explosive Experimental Area Peak Noise Contours

Source: Dahlgren NSF, 2013

Fig3-7_NSF_Dahlgren_EEA_PeakNoise_20141014_JKC.pdf



Matrix DESIGN GROUP

Source: NSWCDD Final EIS, 2013

Figure 3-8: .50 Caliber Peak Noise Contours

NSF Dahlgren Airfield

NSF Dahlgren has one active airstrip - Runway16/34, which is classified as a Class A runway suitable for use by small light aircraft. Current use of the airfield is restricted to daytime visual flight rules for helicopter use of the helipad. No fixed-wing aircraft are permitted to use the runway in its current state. Two additional inactive runways are used for non-aeronautic mission activities such as motorcycle training, storage, parking, and areas that support RDT&E testing.

Source: NSF Dahlgren Master Plan, September 2011

Airfield Safety Zones

Active runways have associated safety zones to limit and guide development, and provide for the safety of the public and pilots while simultaneously allowing for continued economic growth. Safety zones are divided into a Clear Zone (CZ), Accident Potential Zone I (APZ I) and Accident Potential Zone II (APZ II). They are developed based on historical statistical data indicating the most likely place an aircraft accident might occur. There are general recommended guidelines established by the Navy to manage and minimize certain types, densities, and heights of land uses within these safety zones.

Since the runway at NSF Dahlgren is not currently used for fixed-wing aircraft, it does not have associated safety zones. Safety zones could be estimated based on other similar size and class runways; however to have the most accurate information, the Navy would need develop safety zones based on the type of flight operations and directions of aircraft that use the runway.

A description of similarly sized runway safety zones for fixed-wing aircraft is provided as follows.

Fixed Wing Safety Zone

The CZ begins at the end of each runway measuring 1,500 feet wide extending outward in a fan-shape to a length of 3,000 feet from the end of each runway. The fan-shape of this zone flares to a greater width of 2,284 feet wide at the end of the zone. This is the area where an accident involving an aircraft operation is most likely to occur; therefore, this area should remain undeveloped. For the exception of agriculture without livestock and runway lighting, all land uses and structures should be prohibited in this area.

The APZ I is a rectangle that begins at the end of each clear zone and continues in a rectangular shape that extends to a length of 5,000 feet by 3,000 feet wide. This area typically experiences fewer accidents than the CZ and contains fewer recommended land use restrictions.

The APZ II is a rectangle that begins at the end of each APZ I at both ends of the runway extending to a length of 7,000 feet by 3,000 feet wide. APZ II is where land use recommendations are the least restricted due to decreased risk of accidents further from the runway.

Airfield Noise Contours

The two main sources of aircraft noise at NSF Dahlgren are from helicopter and UAV activities. Due to the low number of flight operations at the facility, aircraft / helicopter flights do not generate noise contours above 65 ADNL. The UAVs generate the greatest amount of noise when they fly near the ground during takeoff and landing. The largest size UAV generates noise levels of approximately 80 ADNL; however these noise contours have not been formally designated or identified by the installation to date.

Sources: NAVSEA RDT&E Draft Environmental Impact Statement, 2012

Airfield Imaginary Surfaces

Imaginary surfaces are designated around active runways to determine and identify where vertical obstructions could exist in the vicinity of aviation operations. The various imaginary surfaces build upon one another and are designed to eliminate obstructions to air navigation and operations, either natural or man-made. The extent or size of an imaginary surface depends on the type of runway. Since the runway is not currently used for fixed-wing operations, it does not have associated imaginary surfaces.

The key terms related to imaginary surfaces are described as follows and could possibly be applied to Runway 16/34 if fixed-wing aircraft were reintroduced at NSF Dahlgren in the future.

- The Primary Surface defines the limits of the obstruction clearance requirements in the immediate vicinity of the landing area. It comprises surfaces of the runway, runway shoulders, and lateral safety zones and extends 200 feet beyond the runway end. This surface is 1,000 feet wide, or 500 feet on each side of the runway centerline.
- The Approach-Departure Clearance Surface is symmetrical about the runway centerline and begins as an inclined plane (glide angle) 200 feet beyond each end of the primary surface of the centerline elevation of the runway end, and extends for 10,000 feet. The slope of the approach-departure clearance surface is 40:1 outward and upward along the extended runway (glide angle) centerline until it reaches an elevation of 250 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 10,000 feet from the start of the glide angle. The width of this surface at the runway end is 1,000 feet; it flares uniformly, and the width at 40,000 feet is 2,500 feet.
- The Transitional Surfaces connect the primary surfaces, Clear Zone surfaces, and approach-departure clearance surfaces. The slope of the transitional surface is 7:1 outward and upward at right angles to the runway centerline.

Bird / Wildlife Aircraft Strike Hazard

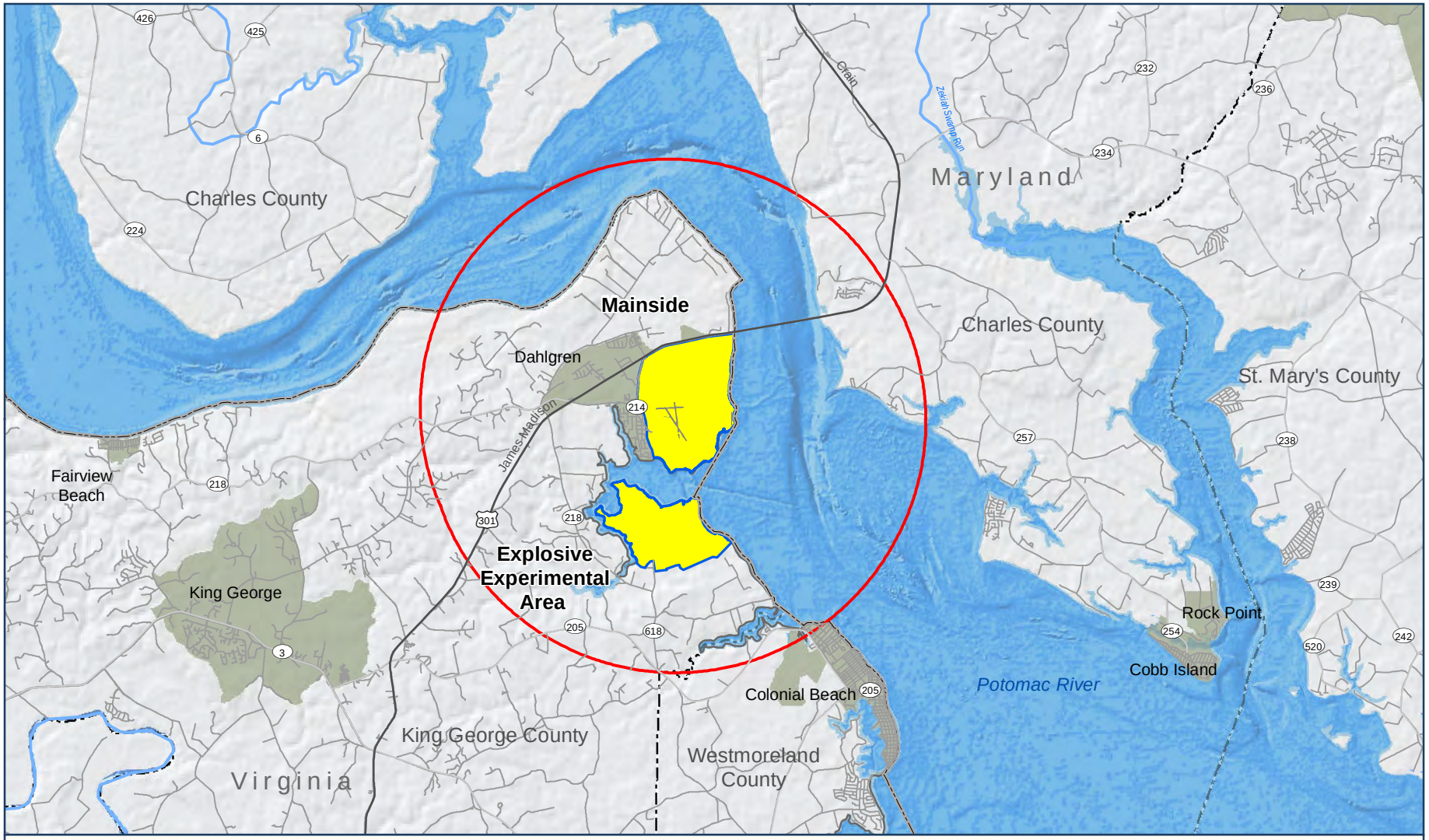
Birds and wildlife can present a significant hazard to military training and flight operations. Certain types of land uses attract birds and wildlife such as open water areas, standing water, and other natural areas. A bird / wildlife aircraft strike hazard (BASH) program has been adopted by NSF Dahlgren to reduce the impact of birds and deer on aircraft operations. Aircraft strikes are almost always fatal to the wildlife and sometimes fatal to the pilots operating sophisticated aircraft. Bird strike damage can be categorized as follows: engine ingestions, canopy penetrations and impact to the fuselage or attached equipment. It is usually an expensive encounter for aircraft, resulting in many millions of dollars in damage and lost testing and training hours annually.

NSF Dahlgren has a variety of facilities and natural areas that inadvertently provide ideal nesting and roosting spots for a variety of birds. Birds that roost on towers, antennas, and other structures are both a nuisance and hazard. Procedures have been developed to reduce structure attractiveness for roosting and nesting. NSF Dahlgren has adopted a BASH Plan to reduce exposure to bird and wildlife hazards on and around the airfield which has resulted in minimal strike incidents. The FAA has identified a five-statute-mile area radiating outward from an airfield where birds and wildlife pose the greatest safety risk to aircraft. Referred to as the BASH relevancy area, this area is identified in Figure 3-9.

Federal Aviation Act (Part 77) Obstruction Evaluation

The Federal Aviation Act [Title 14 Code of Federal Regulations (CFR) Part 77] was enacted in 1958 to provide methods for overseeing and regulating civilian and military use of airspace over the United States. The Act requires the Secretary of Transportation to make long-range plans that formulate policy for the orderly development and use of navigable air space. The intent is to serve the needs of both civilian aeronautics and national defense but it does not specifically address the needs of military agencies. The Federal Aviation Administration (FAA) was created as a result of the Act for a variety of purposes, including the management of airspace over the US.

The 500-foot rule, promulgated by the FAA, states that every citizen of the United States has “a public right of freedom of transit in air commerce through the navigable air space of the United States.” The rule was formally announced in the 1963 Court of Claims ruling in Aaron v. United States and states that flights 500 feet or more AGL do not represent a compensable taking because flights 500 feet AGL enjoy a right of free passage without liability to the owners below.



Source: Dahlgren NSF, 2013
Fig3-9_NSF_Dahlgren_BASH_20141028_JKC.pdf

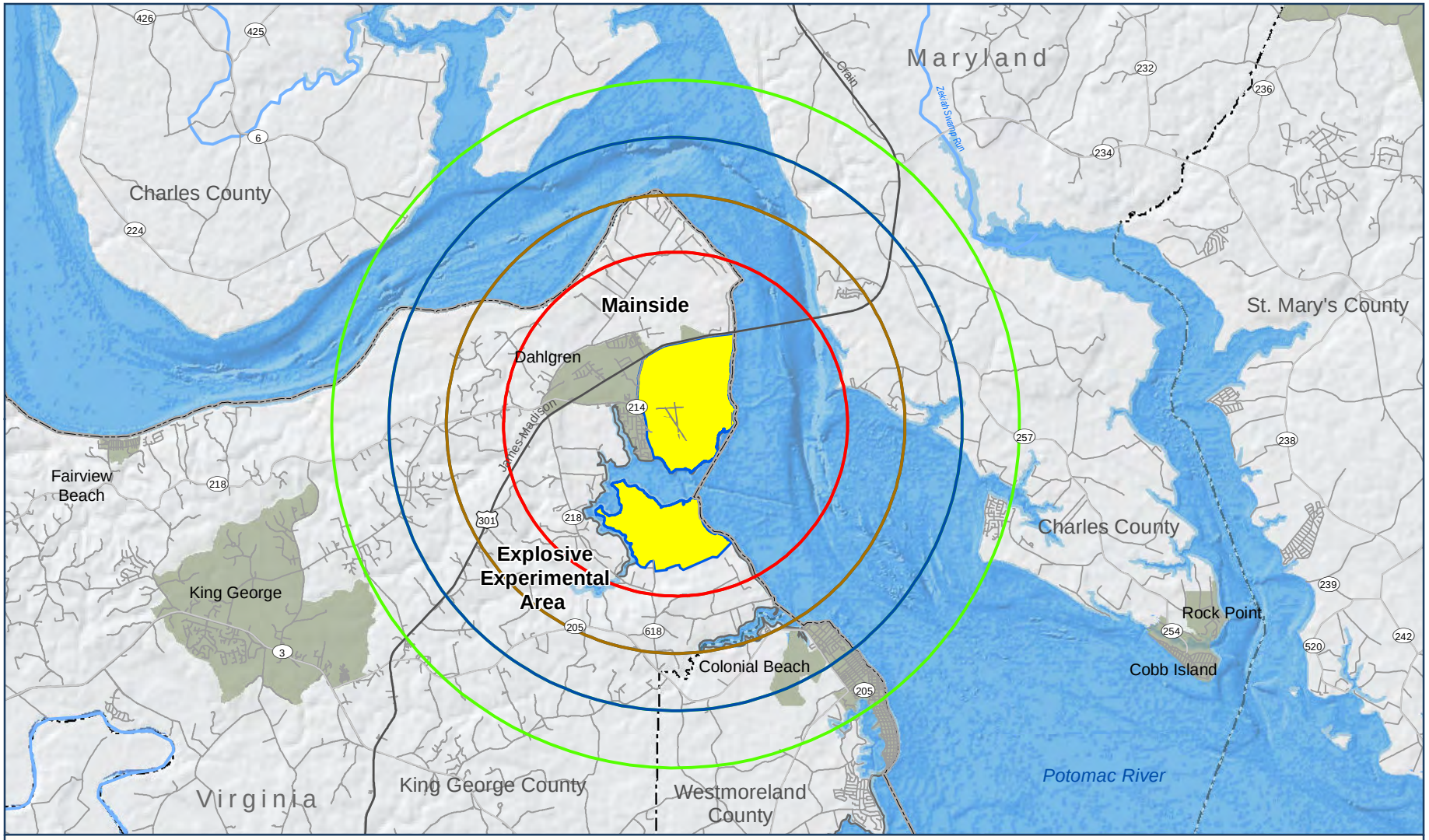
Figure 3-9: BASH Relevancy Area

Another important outcome of the Act is FAA Regulation Title 14 Part 77, commonly known as Part 77, which provides the basis for evaluation of vertical obstruction compatibility. This regulation provides information to evaluate the potential for a vertical obstruction based on the elevation of the airfield, the height and resulting elevation of the new structure or facility, and the location of the structure or facility relative to the airfield in question. This regulation determines compatibility based on the height of proposed structures or natural features relative to their distance from the ends of a runway. Using a distance formula from this regulation, local jurisdictions can easily assess the height restrictions near airfields. Additional information on Part 77 is located on the Federal Aviation Administration Internet site at http://www.faa.gov/.

Part 77.17 is meant to establish standards to determine obstructions within navigable airspace, typically within a certain distance from an airport or airfield. It defines an obstruction to air navigation as an object that is of greater height than any of the following heights or surfaces in the following manner:

- A height of 499 feet AGL at the site of the object.
- A height that is 200 feet AGL or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length. This height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 499 feet; see Figure 3-6 for an illustration of this portion of the FAA Part 77 Vertical Obstruction Compliance.
- A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.
- A height within an en-route obstacle clearance area, including turn and termination areas of a federal airway or approved off-airway route that would increase the minimum obstacle clearance altitude.
- The surface of a takeoff and landing area of a civilian airport or any imaginary surface established under 77.19, Department of Defense (DOD): 77.21, and heliports: 77.2. However, no part of the takeoff or landing area itself will be considered an obstruction.
- Except for traverse ways on or near an airport with an operative ground traffic control service furnished by an airport traffic control tower or by the airport management and coordinated with the air traffic control service, the standards of paragraph (a) of this section apply to traverse ways used or to be used for the passage of mobile objects only after the heights of these traverse ways are increased by:
    - 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance.
    - 15 feet for any other public roadway.
    - 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.
    - 23 feet for a railroad.

For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it. The FAA Part 77 Obstruction Evaluation area for NSF Dahlgren is indicated on Figure 3-10.



Source: Dahlgren NSF, 2013

Fig3-10_NSF_Dahlgren_FAA77_20141028_JKC.pdf

Figure 3-10: FAA Part 77

Explosive Safety Quantity Distance Arcs

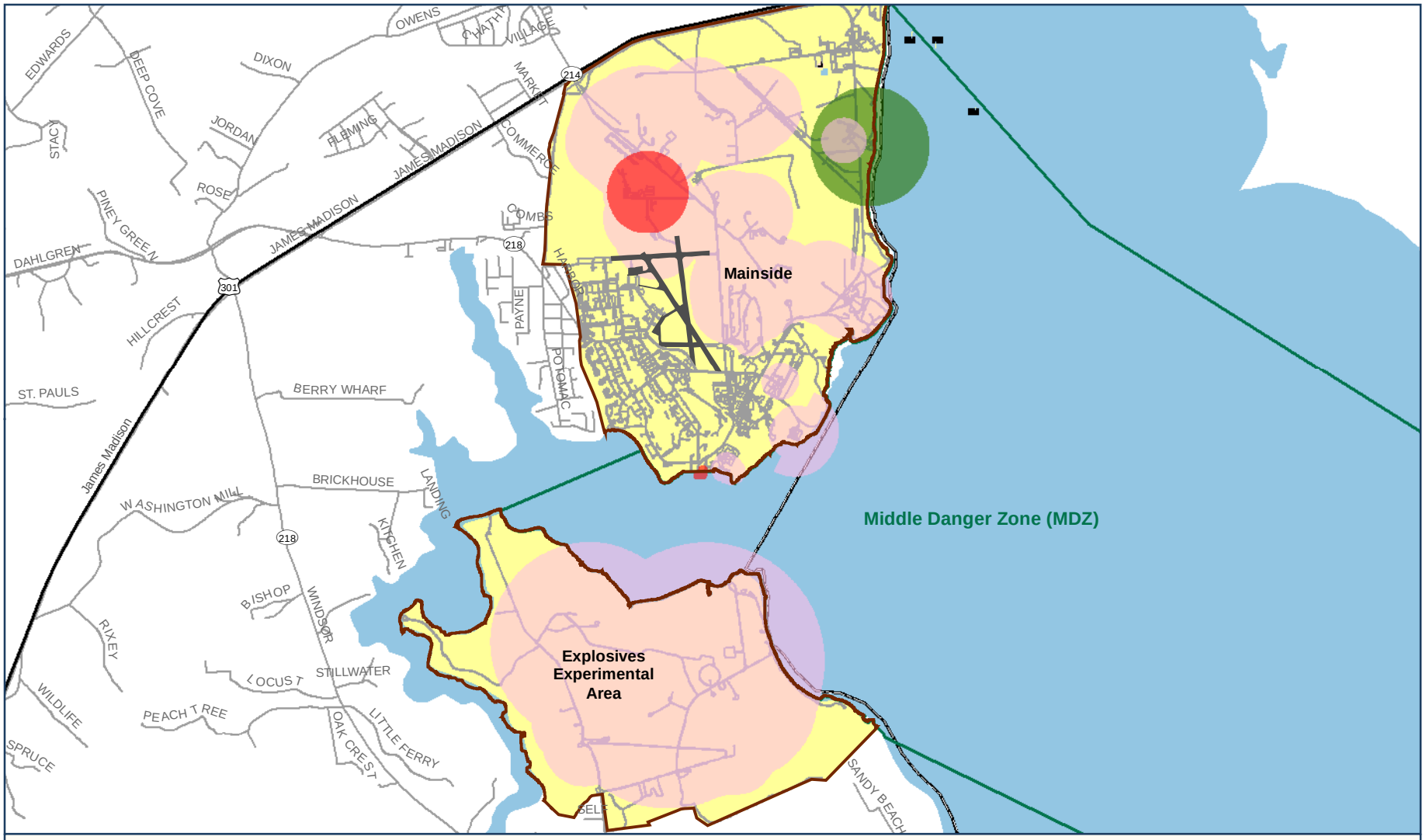
Explosive Safety Quantity Distance (ESQD) arcs are normally concentric in shape, and are typically cast from the corners of an EOL; they provide a safety buffer to mitigate the harm an unplanned detonation could cause to personnel or adjacent structures. The radius of each ESQD arc is determined by both the operation and the net explosive weight of the material at the site.

The ESQD arcs at NSF Dahlgren are generally concentrated around the A&E and RDT&E use areas. Some of these arcs overlap with the northern portions of the airfield on Mainside.

On Mainside, ESQD arcs surround the five A&E storage areas which, are illustrated on Figure 3-11. Additional arcs also emanate from explosive transfer points on loading docks and piers and from intentional detonation points.

On the EEA, ESQD arcs mostly emanate from numerous intentional detonation points from the Churchill and Harris test areas, but arcs are also cast from magazines and explosive operating buildings as well. Portions of these ESQD arcs extend over the waters of Machodoc Creek and the PRTR. When activities occur that are associated with these arcs extend into the waters of the creek, range control utilizes cameras and/or boats monitor boat traffic to prevent encroachment.

Sources: NSF Dahlgren Master Plan, September 2011; NSWCDD RDT&E Final Environmental Impact Statement, 2013



Source: Dahlgren NSF, 2013
Fig3-9_NSF_Dahlgren_ESQD_20141014_JKC.pdf

Figure 3-11: ESQD Safety Arcs

Please see the next page.

4. Compatibility Tools

Inside Chapter 4 . . .

Introduction

This section provides an overview of the existing compatibility tools currently used or applied in evaluating and addressing compatibility issues in the NSF Dahlgren Joint Land Use Study (NSF Dahlgren JLUS) Study Area. Relative to compatibility planning, there are a number of existing plans and programs that are either designed to address compatibility directly or that indirectly address compatibility issues through the topics they cover.

There are three types of planning tools that are evaluated relative to their applicability to address compatibility: permanent, semi-permanent, and conditional. Permanent planning tools include acquisition programs, either fee simple purchase of property or the purchase of development rights. Semi-permanent tools include regulations such as zoning or adopted legislation. Examples of conditional tools would include memorandums of understanding (MOU), intergovernmental agreements (IGA), and other policy documents such as comprehensive plans that can be periodically modified. This Chapter provides an overview intended to identify applicable planning tools and determine how each may apply to compatibility, as presented under the compatibility factors discussed in Chapter 5. The overview is organized by level of government, presented in the following order:

- Federal Plans and Programs
- NSF Dahlgren
- State of Virginia
- State of Maryland
- King George County, VA
- The Town of Colonial Beach, VA

- Westmoreland County, VA
- Charles County, MD
- St. Mary's County, MD
- Regional Plans
- Other References

Federal

Chesapeake Bay Protection and Restoration Program

Executive Order 13508 was signed in May 2009 creating a Federal Leadership Committee to oversee the development of planning processes and research centered on preserving and protecting the Chesapeake Bay. The program works as an extension of the Clean Water Act (CWA) in bringing multiple federal agencies together in six states and the District of Columbia to protect the Chesapeake Bay. As part of the headwaters of the Bay, NSF Dahlgren complies with the plans and policies surrounding water quality and habitat preservation measures outlined in the Chesapeake Bay Action Plan and subsequent Annual Progress Reports.

Clean Air Act

The Clean Air Act (CAA) is the comprehensive federal law that regulates air emissions from stationary and mobile sources in order to control air pollution in the United States. Under the CAA, the U.S. Environmental Protection Agency (EPA) establishes limits on six criteria pollutants through the National Ambient Air Quality Standards (NAAQS). Standards are set to protect public health and public welfare. The CAA also gives EPA the authority to limit emissions of air pollutants coming from sources like chemical plants, utilities, and steel mills. Individual states may have stronger air pollution laws, but they may not have weaker pollution limits than those set by EPA. Under the law, states have to develop State Implementation Plans (SIPs) that outline how each state will control air pollution under the CAA.

Clean Water Act

The CWA governs the management of water resources and controls and monitors water pollution in the U.S. The CWA establishes the goals of eliminating the release of toxic substances and other sources of water pollution to ensure that surface waters meet high quality standards. In so doing, the CWA prevents the contamination of nearshore, underground and surface water sources. Numerous extensions of the Act have been created, including the Chesapeake Bay Protection and Restoration Program and the National Pollution Discharge Elimination System.

Coastal Zone Management Act of 1972

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. § 1451, et seq., as amended) encourages states, in cooperation with federal and local agencies, to develop land and water use programs in coastal zones. The CZMA was initially created in 1972 and is administered by the National Oceanic and Atmospheric Administration (NOAA) Office of Ocean and Coastal Resource Management. The CZMA provides a procedure for states to review federal actions for consistency with their own approved coastal management program, and grants approved states with matching federal funding to administer their programs. To manage their extensive coastlines and associated uses and resources, both Virginia and Maryland administer comprehensive coastal programs. Public access to the shore is also a primary CZMA objective.

Lands that are owned or managed by the federal government are excluded from the CZMA requirements. Section 307 (c)(1) of the Federal Coastal Zone Management Act Reauthorization Amendments (CZMA and CZMARA) of 1979, states that each federal agency conducting or supporting activities affecting any land, water use, or natural resource of the coastal zone must do so in a manner to the maximum extent practicable, consistent with the enforceable policies of each state's CZM program and policies. By this definition, NSF Dahlgren is not subject to CZMA enforcement; however, if a proposed federal activity affects coastal resources or uses beyond the boundaries of the federal property, Section 307 of CZMA applies. Section 307 stipulates that federal projects that affect land uses, water uses, or other coastal resources of a state's coastal zone must be consistent to the maximum extent practicable with the enforceable policies of that state's

federally-approved coastal management plan. Federal consistency with a state's coastal zone management program is demonstrated by means of a coastal consistency determination that is submitted to the state agency responsible for review and comments. Applying for and complying with state permits when required by federal law also achieves consistency.

Department of Defense Conservation Partnering Initiative

In 2003, Congress amended Title 10 U.S.C. §2684a and §2692a (P.L. 107-314), the National Defense Authorization Act, to give authority to the Department of Defense (DOD) to partner with other federal agencies, states, local governments, and conservation based Non-Governmental Organizations (NGOs) to set aside lands near military bases for conservation purposes and to prevent incompatible development from encroaching on and interfering with military missions. This law provides an additional tool to support conservation and environmental stewardship on and off military installations.

Department of Defense Energy Siting Clearinghouse

Section 358 of the 2011 National Defense Authorization Act pertains to studying the impacts of the development of new energy production facilities on military operations and readiness. The Energy Siting Clearinghouse serves to coordinate the DOD review of existing applications for energy projects. Several key elements of Section 358 include designation of a senior official and lead organization to conduct the review of energy project applications, a 30-day time frame for completion of a hazard assessment associated with an application, specific criteria for DOD objections to projects and a requirement to provide an annual status report to Congress. This legislation facilitates procedural certainty and a predictable process that promotes compatibility between energy independence and military capability.

Department of Energy Office of Energy Efficiency and Renewable Energy

The US Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy is responsible for developing and delivering market-driven solutions for energy-saving homes, buildings, and manufacturing; sustainable transportation; and renewable electricity generation.

The DOE's Wind Program funds research and development in wind power technology and evaluates market barriers such as environmental impacts, project siting, permitting processes, and the potential effects on US airspace and waterways. The program also assesses domestic wind energy potential, serves as a technical information resource, assists in the development of wind plant siting and permitting guidelines, and helps to develop testing centers for wind energy equipment.

Department of Housing and Urban Development Noise Regulation

The United States Department of Housing and Urban Development (HUD) has instituted policies through 24 Code of Federal Regulations (CFR) Part 51 designed to promote the creation of controls and standards for community noise abatement by state and local governments to reduce noise levels for homes. Included among the various policies are:

> *(1) a requirement that noise exposure and sources of noise be given adequate consideration as an integral part of urban environment in connection with all HUD programs, which provide financial support to planning;*
>
> *(2) a withholding of HUD assistance for the construction of new dwelling units on sites (which have or are projected to have unacceptable noise exposure);*
>
> *(3) encouragement of modernization efforts for existing buildings in noise environments; and*
>
> *(4) grants and allowances to state and local governments to provide acoustical privacy in multifamily dwellings through building design and acoustical treatment.*

New housing construction assisted or supported by HUD must meet the exterior noise standards outline in the regulation. HUD funds may also be available to encourage noise abatement planning and acoustical treatment for proposed and existing incompatible land uses.

Approvals of mortgage loans from the Federal Housing Administration and the Veterans Administration are subject to this HUD circular. The circular sets forth a discretionary policy to withhold funds for housing projects when noise exposure is in excess of prescribed levels. Residential construction may be permitted within certain noise contours, provided sound attenuation is accomplished. The added construction expense of sound attenuation, however, may make siting in these noise exposure areas financially less attractive. Because the HUD policy is discretionary, variances may also be permitted, depending on regional interpretation and local conditions. These new structures could then incorporate noise-inhibiting features into their design and construction when using these loans.

Endangered Species Act

The Endangered Species Act (ESA) establishes a program for the conservation of threatened and endangered plants and animals and their habitats. The US Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) are the lead implementing agencies of the ESA. The ESA requires federal agencies, in consultation with the USFWS and/or the NOAA Fisheries Service, to ensure that actions they "authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species." The law also prohibits any action that causes a taking of any listed species of endangered plant, fish, or wildlife. The ESA provides a platform for the protection of critical habitat and species that may be at risk of extinction.

There are currently no species living on or near NSF Dahlgren which are listed under the Act.

Integrated Natural Resources Management Plans

The Sikes Act Improvement Act of 1997 requires every DOD installation located in the U.S. to prepare, maintain, and implement an Integrated Natural Resources Management Plan (INRMP). An INRMP is prepared by the secretary of every military service and military installation in cooperation with the USFWS and State fish and wildlife agencies. This collaboration ensures proper consideration of fish, wildlife, and habitat needs. The military mission, protects the ecological condition, and provides for appropriate public use of military-owned and withdrawn lands.

The Sikes Act requires INRMPs to be reviewed at least every 5 years with the Service and the States. The most recent INRMP for NSF Dahlgren was completed in 2007. NSF Dahlgren's INRMP addresses the installation's mission; the baseline condition of natural resources; the impacts of the mission on natural resources; the management approaches to conserve and enhance natural resources; and specific projects aimed at protecting and enhancing existing natural resources.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 is a federal regulation that established a U.S. national policy promoting the protection and enhancement of the environment and requires federal agencies to analyze and consider the potential environmental impact of their actions. The purpose of NEPA is to promote informed decision-making by federal agencies by making detailed information concerning significant environmental impacts available to both agency leaders and the public.

All projects receiving federal funding require NEPA compliance and documentation. NEPA is applicable to all federal agencies, including the military. Not all federal actions require a full Environmental Impact Statement (EIS). In cases where an action may not cause a significant impact, the agency would prepare an Environmental Assessment (EA).

A NEPA document can serve as a valuable planning tool for local planning officials. An EA or EIS can assist in the determination of potential impacts that may result from changing military actions or operations and their effect on municipal policies, plans and programs, and the surrounding community. Public hearings are required for all EIS documents released under NEPA. An EA requires publishing the draft EA and Finding of No Significant Impact (FONSI) and also allowing public comment for a period of 30 days. An EA can either end in a FONSI, or a Record of Decision (ROD) that concludes there will be a significant impact. The information obtained by the EA / EIS is valuable in planning coordination and policy formation at the local government level.

NEPA mandates that the military analyze the impact of its actions and operations on the environment, including surrounding civilian communities. Inherent in this analysis is an exploration of methods to reduce any adverse environmental impact. The EIS is a public process that encourages participation by the community.

National Pollutant Discharge Elimination System

Pursuant to the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources such as pipes or man-made ditches that discharge pollutants into US waters. According to the law, individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Traditionally, NPDES focused on point sources however, more recently the focus has shifted to nonpoint sources. Nonpoint sources generally include sheet flow runoff from pavement, agricultural fields and lawn areas, which by their nature, are more difficult to regulate.

Navy Encroachment Management Program

An Encroachment Action Plan (EAP) is an important tool that is developed as a blueprint for an installation or range's Encroachment Management Program. An EAP is designed to identify, quantify, assess, and provide recommendations to mitigate or prevent encroachment impacts around Navy installations. An EAP responds to the requirements of the Navy Encroachment Management Program as described in OPNAVINST 11010.40. Encroachment is primarily any non-Navy action planned or executed which inhibits, curtails, or possesses the potential to impede the performance of Navy activities. An EAP provides the host installation with a methodological approach to address existing and potential encroachment that may impact the Navy's mission. This includes regularly sharing information, analysis, and insights relevant to encroachment and the requirements of current and future test and training operations. Each Navy installation utilizes its EAP to support the analysis and implementation of encroachment mitigation efforts.

The EAP for NSF Dahlgren was developed for the Naval Support Activity South Potomac encompassing NSF Indian Head, Maryland, Virginia and their surrounding environments. The final draft was published in August 2007 and focuses on various encroachment issues that could potentially impact the missions on the installations.

Noise Control Act of 1972

The Noise Control Act of 1972 determined that noise not adequately controlled has the potential of endangering the health and welfare of the people. It states that all Americans are entitled to an environment free from noise that can jeopardize their general health and quality of life. Along with state, local, and territorial governments, actions from the federal government were needed to ensure that the objectives of the Act were met.

Concurrently, military installations were experiencing the impacts related to encroaching urban development locating adjacent to their boundaries and the resulting complaints regarding noise from military flight operations. The Navy responded by implementing DOD Instruction 4165.57 establishing the Air Installations Compatibility Use Zone (AICUZ) program through Chief of Naval Operations Instruction (OPNAVINST) 11010.36C to provide guidance

to Navy installations. The AICUZ program was developed to protect the public and military installation missions by identifying areas impacted by noise and encroaching incompatible land uses. With the AICUZ guidelines, land encroachment and noise-sensitive development can be minimized.

As communities grow, it is important that the military installation, developers, and the affected communities work together to mitigate the issue of noise and develop ways to coexist compatibly.

Readiness and Environmental Protection Initiative

This initiative enables DOD to work with state and local governments, non-governmental organizations, and willing landowners to limit encroachment and incompatible land use through land acquisition by the establishment of conservation easements, land trusts, or the purchase of property. The program provides funding to support these land acquisition efforts to preserve the land around military installations, wildlife habitats, and local communities.

Telecommunications Act of 1996 and the Federal Communications Commission

The Telecommunications Act of 1996 was the first comprehensive update to a federal telecommunication law in over 60 years and was in large part intended to open up the marketplace to greater competition. Changes in the means through which information is produced, accessed, stored, and shared made the federal government response imperative. The increasing use and development of personal mobile phones, satellite transmission, high speed fiber optics, and other related factors are often pushing demand beyond the system capacity.

New telecommunication tower siting requires compliance with the Federal Communications Commission's (FCC) environmental review standards and procedures, including NEPA and ESA compliance, National Historic Preservation Act compliance, adherence to any applicable FAA requirements and structure registration with the FCC. The actual approval of physical installations is subject to state and local permits and approvals; however, state and local authority is limited by FCC law. For instance, states and local jurisdictions cannot base their decisions on any purported environmental effects of radio frequency transmissions. Telecommunications towers have the potential to cause line of sight issues near NSF Dahlgren. Requirements for tower placement can help to reduce potential incompatibility.

Naval Support Facility Dahlgren

NSF Dahlgren Master Plan, 2011

The Master Plan for NSF Dahlgren was completed in September 2011 as the primary long-range planning document for the facility. Prior to the 2011 Master Plan, it had been 22 years since the completion of the previous Master Plan. Significant changes in the global vision, mission, and command of the Navy have occurred since then, and the Master Plan has been updated to reflect those changes. The Plan outlines the study boundaries for the document, offers a land and facilities use plan, which includes information about the activities undertaken at NSF Dahlgren and the surrounding environment, and how activities may affect that land and environment. The Plan also includes a vision for the future, which is a long-term plan for the land and facilities, and finally, a capital improvements plan, which programs projects as a means to achieve the planning vision of NSF Dahlgren.

NSF Dahlgren's tenants, such as the Naval Surface Warfare Center, Dahlgren Division (NSWCDD), conduct unique research, development, test and evaluation (RDT&E) mission, much of the impact on the surrounding environment is actually off-installation, and resides mostly in the Upper, Middle, and Lower Danger Zones (UDZ, MDZ, and LDZ, respectively). The physical assets of NSF Dahlgren are substantial, however, with 576 buildings, 253 structures, and 58 utilities. The facility is also home to the NSF Dahlgren airfield, established in 1923, which is restricted to day visual flight rules (VFR) helicopter use of the helipad, and cannot support fixed wing operations. This airfield primarily impacts the areas north into King George County as well as south into the Potomac River.

The more impactful component of the installation is related to ammunition and explosive (AE) operations. Ammunition and explosive (A&E) operations have been a part of NSF Dahlgren's primary mission since its founding in

1918. Over this period of time, the Navy created the Naval Ordnance Safety and Security Activity (NOSSA) to establish standards for all Navy installations where explosives are present and criteria for the siting of explosive activities. Within NOSSA, requirements for explosive safety quantity distance (ESQD) arcs are established. These ESQD arcs are intended to protect personnel and equipment by requiring separations between explosive facilities and other structures. These ESQD arcs create significant limitations for AE activities on the installation.

There are two active test range complexes where AE activities occur – the first being the Explosives Experimental Area (EEA), the land range located at the Pumpkin Neck Annex, where ordnance performance, lethality, and safety are tested. The other complex is the Potomac River Test Range (PRTR) where unique over-the-water activities occur. The PRTR consists of 715 acres of land area and a 169 square-nautical-mile water area that stretches for 51 miles down the lower Potomac River, toward Chesapeake Bay.

A review of the Master Plan reveals the following areas of interest related to military compatibility:

The Master Plan focuses primarily on the installation and range complexes themselves, and addresses the surrounding communities in a way that does not offer compatibility guidelines.

Though land use issues are addressed in the Master Plan, compatibility guidelines are not offered to prevent future encroachment and maintain mission readiness.

Naval Surface Warfare Center, Dahlgren Division (NSWCDD) Environmental Impact Statement, June 2013

An Environmental Impact Statement (EIS) was prepared for continued operation of RDT&E activities conducted by NSWCDD within the PRTR, EEA, Mission Area, and Special-Use Airspace (SUA) at NSF Dahlgren. The EIS was prepared to address the RDT&E activities that take place outdoors and have the potential to affect the human environment. The trigger for the EIS was the proposed expansion of NSWCDD's RDT&E activities within the PRTR and EEA range complexes. Three alternatives were proposed, a No Action Alternative, and Alternatives 1 and 2. Since it was determined that all three alternatives would have no significant impact, the Navy chose Alternative 2, the largest increase in activity, to meet current and future demand. The expansion of activities includes number of large-caliber gun firings and detonations, electromagnetic energy, which would increase in both frequency and magnitude, and high-energy lasers, which would be used more frequently. Overall, PRTR use will increase from 750 total annual hours to 1,000 hours.

The affected area includes some of the surrounding communities, which are part of the study area for this JLUS. A review of the EIS reveals the following areas of interest related to military compatibility:

1. The land use impacts of expanded operations at NSF Dahlgren and its range complexes are not addressed for communities surrounding Dahlgren, the EEA or the PRTR, aside from stating that increased activities may have an impact on water-based recreational activities and noise levels, as addressed in the EIS.

2. The socioeconomic impacts of activities conducted by NSWCDD at NSF Dahlgren are limited to coal barge operations, commercial fishing, recreational activities, and real estate. These impacts are not inclusive of the employment at NSF Dahlgren, the income generate by NSWCDD's operations, such as contracts and purchase orders, or the impacts of encroachment on operations at NSF Dahlgren or its range complexes.

3. Noise impacts are presented, but only for Alternative 1, an increased impact from present impact. Impacts are shown along the PRTR and EEA, but again, only for Alternative 1.

Regulations for Safe Boating in the Middle Danger Area of the Potomac River

Due to the RDT&E activities taking place at NSF Dahlgren, the PRTR Complex has been classified into three geographic areas to alert mariners where access may be restricted. The zones are classified into the Upper Danger Zone (UDZ), Middle Danger Zone (MDZ), and Lower Danger Zone (LDZ), with the Middle Danger Zone receiving the heaviest use. Naval Sea Systems Command (NAVSEA) has published regulations for safe boating in the MDZ of the PRTR, which is in the lower Potomac River.

There are several standards designed to increase safety for boaters in the MDZ and the upper section of the LDZ. The safety of watercraft traffic is of utmost importance to NSF Dahlgren, and though aircraft traffic is of great concern, it is not covered by these regulations. The PRTR is hazardous to watercraft when guns, ordnance, or other devices are being tested at NSF Dahlgren, and the area is marked by a series of station range boats with white hulls and "international" orange superstructures that are placed in proximity to areas that are hazardous during these times. The boats are typically stationed at four or more range stations to protect watercraft traffic in the area. These boats bear a red flag when hazardous activities are occurring, which signals to boaters that they must not enter any portion of the danger area without prior permission from the captain of the nearest range control boat. The patrol boats are available during firing hours to guide watercraft through the MDZ and increase the safeness of the journey. Firing schedules are arranged to cause minimum inconvenience to watercraft traffic and are generally short in length.

These regulations are in place in order to control entry and operations within the PRTR, and are enforced by range control boat captains, but it is stated that NSF Dahlgren intends to cooperate with and assist operators or watercraft in the PRTR.

Operational Noise Consultation

In December 2009 a noise consultation was done for Naval Facilities Engineering Command (NAVAC) to recommend which areas should be considered in the NSF Dahlgren JLUS. A noise-producing activity of concern includes the NSWCDD RDT&E testing of large-caliber weapons and explosive detonations on the PRTR and EEA. The consultation follows the Noise Zones outlined in OPNAVINST 11010.36C.

To minimize the impact of noise, NSWCDD uses a Sound Intensity Prediction System which monitors noise conditions. The system accounts for the amount of sound energy released by the test, landscape of the area, and current weather conditions. If the noise is predicted to be too loud, testing will be interrupted.

The consultation provides several land use recommendations:

- Include the information from this consultation in the appropriate JLUS documentation.
- Due to the risk of noise complaints from off-base neighbors related to the proposed operational noise, the Navy should continue with its extensive operational noise management and outreach program including using SIPS for delaying operations when necessary and informing the public of possible noise from training.
- OPNAVINST 11010.36C states that noise-sensitive land uses are not recommended in Zone III and normally not recommended in Zone II. It is recommended that noise-sensitive land uses be limited as much as possible in these areas.
- Ideally, all areas which even occasionally are exposed to high noise levels from operational noise are considered when discussing land use policy. Additionally, ideally these areas will not be zoned to allow high density residential land use.

Noise and Vibration Measurements at Six Historic Structures

The National Historic Preservation Act requires federal agencies to consider the effects of projects on properties listed in, or eligible for listing in, the

National Register of Historic Places. In November 2006, NSWCDD conducted a noise and vibration measurement program near the PRTR to determine the effects of firing a large-caliber gun with high-explosive projectiles. Nosie and vibration measurements were taken during scheduled testing where the largest guns that are used were fired with projectiles containing the maximum amount of detonation explosives. The tests provided a peak level basis for analysis at sensitive locations. The results of the test concluded that all measured noise levels were below 134 dBP (the threshold for plaster or crack damage in deteriorated structures). Therefore, it is unlikely that NSWCDD's noise and vibration levels would damage historic structures.

Naval Surface Warfare Center, Dahlgren Division Strategic Plan (2015-2020)

The Naval Surface Warfare Center Dahlgren Division Strategic Plan provides both a strategic vision and strategic goals for facilities that the support current and future NSWCDD mission. This plan establishes four strategic goals, technical excellence, workforce, strategic communications, and business excellence. Each of the goals outlines multiple initiatives to move forward and achieve the goal. The goals involve the following:

- Technical Excellence Goal: Deliver innovative solutions for emerging warfighter challenges by leveraging our Naval Warfare Systems Development and Integration capabilities.
- Workforce Goal: Attract, develop and retain a talented, diverse and engaged workforce.
- Strategic Communications Goal: Clearly and deliberately articulate NSWCDD's value to key audiences.
- Business Goal: Establish and utilize an effective and efficient business model that enables our technical mission.

2005 Naval District Washington Regional Shore Infrastructure Plan

Naval District Washington (NDW) provides regional common operating support to naval installations within a 100-mile radius of the Pentagon. NSF Dahlgren is one of 17 Navy installations in the District that are covered by the NDW Regional Shore Infrastructure Plan (RSIP). The RSIP was prepared to establish a comprehensive approach to managing the Navy's resources, facilities, and infrastructure. The primary goals of the RSIP are to: reduce footprints and costs; increase existing capabilities and sustainability; and maximize mission efficiencies. Two recommendations are particularly relevant to NSF Dahlgren:

> *Recognize NDW as an RTD&E center: "The high concentration of RDT&E missions and facilities in the region is a unique occurrence in the Navy and provides an opportunity for NDW to stand out among other regions." RDT&E is "a priority for the Navy because of the continuing requirement to test and evaluate many weapons and platforms that are procured."*
>
> *Maximize existing facilities for highest and best use: under this recommendation, the Dahlgren Airfield is called out as an under-utilized facility with potential for better use: "The UAV testing program is rapidly expanding and will reach limits within Naval Air Station Patuxent River and Webster Field air spaces. The Air Operations Program Director must evaluate the necessary resources and facilities to support UAV testing or another air operations mission at Dahlgren."*

Commonwealth of Virginia Plans and Programs

The Commonwealth of Virginia has several laws that establish the guidelines for its municipalities and counties to regulate land uses and plan for their future. The body responsible for creating, drafting, and enacting legislation to assist in governing the Commonwealth of Virginia is the General Assembly comprised of the Senate and House of Delegates. The State of Virginia is a Dillon Rule state, meaning that the municipal governments only have the powers that are expressly granted to them by the state legislature: those

that are necessarily implied from that grant of power and those that are essential and indispensable to the municipality's existence and function.

The Code of Virginia specifically addresses planning and zoning for municipalities and counties. Title 15.2 – Counties, Cities and Towns contains provisions for comprehensive plans, zoning ordinances, subdivision ordinances, and the Virginia Uniform Statewide Building Code (USBC).

Comprehensive Plans

Virginia law mandates that every local government in Virginia prepare and adopt a Comprehensive Plan (§ 15.2-2223). The Comprehensive Plan is the foundation for all decision-making in matters involving land use planning and growth management, is considered advisory, and serves as a guide for the physical development of the territory within specific jurisdictional boundaries. Although the Comprehensive Plan itself does not directly regulate land use, the plan does have status as a fundamental instrument of land use control once it is adopted by the local governing body.

The State code (§ 15.2-2224) identifies four primary tools communities can use to implement local plans: Capital Improvement Program, the Official Map, Subdivision and Site Plan Regulations and Zoning.

Capital Improvement Program

Virginia Code § 15.2-2239 authorizes the local Planning Commission to prepare and submit a Capital Improvement Program (CIP) to the governing body or official charged with preparation of a local budget as directed. Though not required, if directed by the local governing body, the Planning Commission shall prepare and revise annually a CIP that is based on the Comprehensive Plan for a period not to exceed the ensuing five years. The CIP is an integral component of a jurisdiction's overall growth management program that outlines the scheduling of public physical improvements and related costs over a five-year period.

Subdivision and Site Plan Regulations

Land subdivision and development standards are contained in § 15.2-2240 through § 15.2-2279 of the Virginia Code. As prescribed, a subdivision ordinance will specify administrative procedures to be followed in the division of land; design standards for subdivisions; and the identification of improvements (e.g., streets, utilities) to be installed. The subdivision ordinance establishes the procedures, platting and design requirements, as well as surety guarantees for public infrastructure improvements, associated with the subdivision of land into parcels or lots of development. Each local government in Virginia is required to adopt a subdivision ordinance to assure that land development occurs in an orderly and safe manner.

Zoning

Standards authorizing the use of zoning in Virginia are found in § 15.2-2280 of the State code. The purposes of zoning are spelled out in §-15.2-2283 of the code, while matters that a locality shall consider when developing a zoning ordinance and when applying or using the zoning ordinance are outlined in § 15.2-2284. Zoning is considered the quintessential tool of Comprehensive Plan implementation. Zoning divides a locality into specific districts and establishes regulations concerning the use, placement, spacing and size of land and buildings within the respective districts. Zoning is intended to avoid disruptive land use patterns by preventing activities on one property from generating external effects that are detrimental to other properties.

Building Code

The Virginia Uniform Statewide Building Code (USBC) contains the building regulations that must be complied with when constructing a new building or structure, or when adding an addition to an existing building. It must also be used when maintaining or repairing an existing building or renovating or changing the use of a building or structure. The provisions of the Virginia USBC are based on nationally recognized model building and fire codes published by the International Code Council, Inc. The model codes are made part of the Virginia USBC through a regulatory process known as incorporation by reference. The Virginia USBC also contains administrative provisions governing the use of the model codes and establishing requirements for the enforcement of the code by the local building

departments and other code enforcement agencies. The USBC is divided into three stand-alone pieces: the Virginia Construction Code, Virginia Rehabilitation Code, and Virginia Maintenance Code.

- **The Virginia Construction Code** contains regulations specific to the construction of new buildings and structures, as well as alterations, additions and change of occupancy in existing buildings and structures.
- **The Virginia Rehabilitation Code** contains optional regulations specific to the rehabilitation of existing buildings that may be used as an acceptable alternative to the Construction Code.
- **The Virginia Maintenance Code** contains the regulations for the maintenance of existing structures, which are enforced at the discretion of the local governments.

The Virginia USBC has specific provisions for changes to the International Building Code (IBC) such as requiring sound attenuation standards for residential structures within certain aircraft noise zones. The Virginia USBC allows for properties to have a nonconforming use if it already existed before the passage of the code. If a permit for an update is requested to the building or structure, it generally must comply with the code when the update is completed.

The Virginia Code only mentions airport noise zones, which are not applied to the noise zones at NSF Dahlgren. The noise zones at NSF Dahlgren are not mentioned in the Code.

Conservation Reserve Enhancement Program

The Conservation and Recreation Enhancement Program aims to improve Virginia's water quality and wildlife habitat by offering rental payments to farmers who voluntarily restore riparian buffers, filter strips and wetlands through the installation of approved conservation practices. State cost-share payments are administered through local Soil and Water Conservation District offices. The State will reimburse up to 25 percent, not to exceed $200 per acre of restored buffer or wetland, of conservation practice costs deemed eligible by the local Soil and Water Conservation District. There is also a 25 percent state income tax credit for out-of-pocket expenses, thus further reducing the landowner's cost. Federal reimbursement is made through the Farm Service Agency for up to 50 percent of a participant's eligible expenses for implementing best management practices, such as fencing or alternative

Chesapeake Bay Preservation Act

The Chesapeake Bay Preservation Act (Bay Act), enacted in 1988, was designed to improve water quality by requiring effective land management. The goal of the Act was to maintain water standards, but still permit reasonable development to occur. The main focus is on reduction and prevention of nonpoint source pollution. Local governments maintain primary responsibility for specific land use decisions and management of water quality. The Act is the only State program that deals with the comprehensive relationship between land use planning and water quality. The Bay Act is under the jurisdiction of the State Water Control Board. One of the responsibilities of the Board is to ensure that local plans and ordinances are in compliance with the Bay Act regulations. Under the Bay Act each locality in the Tidewater Region must adopt a program based on the Act.

Joint Exercise of Powers

Virginia Code § 15.2-1300(A) authorizes local governments to jointly exercise any power granted to it with any other local government having similar powers. This would extend to the joint exercise of land use planning and zoning authority around a military installation if such an effort were desired by local governments having authority over the area. This is intended to foster cooperation between municipalities facing common issues. This could theoretically allow the adoption and enforcement of a regionally uniform set of land use regulations, building codes and other compatibility measures in areas of concern to help enhance compatibility with a military installation.

Land Preservation Tax Credits

Virginia allows an income tax credit for individuals up to 40 percent of the value of donated land or conservation easements. Taxpayers may use up to $100,000 per year for the year of sale and the ten subsequent tax years.

Unused credits may be sold, allowing individuals with little or no Virginia income tax burden to take advantage of this benefit.

To be eligible for tax credits, the easement must qualify as a charitable deduction under the Internal Revenue Service Code and meet additional requirements under the Virginia Land Conservation Incentives Act. Donors claiming a state tax credit of $1 million or more must meet the Conservation Value Review Criteria adopted by the Virginia Land Conservation Foundation Board.

Land and Water Conservation Fund

The Department of Conservation and Recreation administers a grant-in-aid program for acquisition and development of public outdoor recreation areas and facilities to public bodies. Towns, cities, counties, regional park authorities and state agencies may apply for 50 percent matching fund assistance from the Virginia Outdoors Fund. When available, these funds are provided through state general fund appropriations and from federal apportionment from the Land and Water Conservation Fund meant for the acquisition and / or development of outdoor recreation areas. This is a reimbursement program meaning that the sponsoring agency should be capable of financing the project while requesting periodic reimbursement.

Purchase of Development Rights Program

The Office of Farmland Preservation at the Virginia Department of Agriculture and Consumer Services helps localities establish local Purchase of Development Rights (PDR) programs. The PDRs compensate landowners who voluntarily place an agricultural conservation easement on their property.

A Model PDR Program for Virginia outlines the program elements that each local PDR program should address and has recommendations for maximizing the success of these local programs in Virginia. Twenty two localities have established a local PDR program.

Virginia Land Conservation Fund

The Virginia Land Conservation Fund is administered by the Virginia Land Conservation Foundation to conserve certain categories of land. Those categories are: open spaces and parks, natural areas, historic areas, and farmland and forest preservation. The foundation establishes, administers and makes expenditures from the Virginia Land Conservation Fund, which is special, non-reverting money in the state treasury. An interagency taskforce reviews and recommends grant applications to the Virginia Land Conservation Fund. Grant awards are based on applications for 50 percent or less of total project costs pursuant to specific criteria defined in each category.

Virginia Open Space Lands Preservation Trust Fund

This Fund helps landowners cover costs of conveying conservation easements and the purchase of all or part of the value of the easements. Conservation easements preserve farmland, forestland, and natural and recreational areas by restricting intensive uses, such as development and mining, which would alter the conservation values of the land. Priority may be given to applicants who seek cost re-reimbursement only, demonstrate financial need, or cover a family-owned or -operated farm. Costs that the fund may reimburse include:

- legal costs,
- appraisal and other costs, and
- all or part of the easement's value.

Real Estate Disclosures

While only specifically authorized and required for use in conjunction with defined noise and accident potential areas around military air installations, the statutory framework currently exists in Commonwealth law for the implementation of real estate disclosures for military operational impacts. Disclosures are currently required for both the sale and rental of property that is potentially impacted by noise or safety concerns from an air installation.

The Virginia Code was amended through Senate Bill 1029 to enhance the degree of coordination required between local governments and military installations within areas covered by their comprehensive plans and / or land use regulations. Specifically, Virginia Code § 15.2-2200 was amended

to add the following statement in the declaration of legislative intent regarding land use planning:

> *§ 15.2-2200. Declaration of legislative intent. This chapter is intended to encourage localities to improve the public health, safety, convenience, and welfare of their citizens and to plan for the future development of communities to the end…that the concerns of military installations be recognized and taken into account in consideration of future development of areas immediately surrounding installations and that where practical, installation commanders shall be consulted on such matters by local officials…*

> *§ 15.2-2204 D. When (i) a proposed comprehensive plan or amendment thereto, (ii) a proposed change in zoning map classification, or (iii) an application for special exception for a change in use involves any parcel of land located within 3,000 feet of a boundary of a military base, military installation, military airport, excluding armories operated by the Virginia National Guard, or licensed public-use airport then, in addition to the advertising and written notification as required by this section, written notice shall also be given by the local commission, or its representative, at least 30 days before the hearing to the commander of the military base, military installation, military airport, or owner of such public-use airport, and the notice shall advise the military commander or owner of such public-use airport of the opportunity to submit comments or recommendations.*

Senate Bill 1029 also added a mandate for local planning commissions to consult the military regarding potential development that could affect an installation with the following amendment to Virginia Code § 15.2-2211. Local governments in Virginia that exercise planning and zoning authority are required to coordinate with and consult military installations whenever a comprehensive plan amendment, zoning map amendment or an application for a special exception that would result in a change of use affects any parcel of land within 3,000 feet of a military installation. Because NSF Dahlgren is located within Virginia, the communities participating in this JLUS are affected by this requirement.

> *Virginia Code § 15.2-2211. Cooperation of local planning commissions and other agencies… The planning commission of any locality shall consult with the installation commander of any military installation that will be affected by potential development within the locality so as to reasonably protect the military installation against any adverse effects that might be caused by the development…*

Virginia Residential Property Disclosure Act

The Virginia Residential Property Disclosure Act, Title 55, Chapter 27 of the Code of Virginia, governs the information owners must provide to prospective purchasers of real property. Section 55-519.1 details required disclosures for residences proximate to a military air installation and states:

> *The owner of residential real property located in any locality in which a military air installation is located shall disclose to the purchaser whether the subject parcel is located in a noise zone or accident potential zone, or both, if so designated on the official zoning map by the locality in which the property is located on a form provided by the Real Estate Board. Such disclosure shall state the specific noise zone or accident potential zone, or both, in which the property is located according to the official zoning map.*

Virginia Coastal Zone Management Act

Westmoreland and King George counties are within Virginia's designated coastal zone. Virginia has developed and implemented a federally-approved coastal resources management program describing current coastal legislation and enforceable policies. The Virginia Coastal Resources Management Program has nine enforceable policies: fisheries management, subaqueous lands management, wetlands management, dune management, non-point source pollution control, point source pollution control, shoreline sanitation, air pollution control, and coastal lands management. Federal consistency determinations in Virginia are reviewed by the Virginia Department of Environmental Quality, which coordinates reviews with other state agencies as well as county and regional planning agencies.

Virginia Energy Plan

The 2010 Virginia Energy Plan assesses Virginia's energy picture through an examination of the state's primary energy sources: electricity, coal, nuclear, natural gas, renewables, and petroleum. The plan recommends actions to meet several key goals:

- Grow both traditional and alternative energy production, jobs and investment.
- Increase the use of conservation and efficiency.
- Expand public education about Virginia's energy production and consumption, its effect on the economy, and how Virginia residents can use energy more efficiently.
- Maximize the investment in clean energy research and development through the work of the Universities Clean Energy Development and Economic Stimulus Foundation.

Section 6 of the Energy Plan contains information regarding renewable energy sources, including wind. Estimates for potential offshore wind generating capacity exceed 28,000 megawatts. The plan includes the ambitious goal of making Virginia the "energy capital of the East Coast" and sets a target of growing in-state energy production up to 20 percent by the year 2020.

Virginia Military Advisory Council

The Virginia Military Advisory Council is a statutorily constituted body comprising military representatives from installations in the Commonwealth of Virginia as well as several elected and appointed officials. The Virginia Military Advisory Council was formed by the executive branch of the state government to maintain a cooperative and constructive relationship between the Commonwealth and the leadership of the numerous Armed Forces installations within the Commonwealth, and to encourage regular communication on continued military facility viability, the exploration of privatization opportunities and issues affecting preparedness, public safety and security.

State of Maryland Plans and Programs

Comprehensive Plans and Zoning Ordinances

Comprehensive plans capture the vision of how people want their communities to function and grow. In Maryland, local jurisdictions are required to review and, if necessary, update their comprehensive plans every ten years. The Maryland Department of Planning offers technical assistance for these updates. The Land Use Article of the Annotated Code of Maryland outlines different elements that the comprehensive plan must address and gives the planning commission the authority to include additional elements not required by the Land Use Article. Comprehensive Plans typically include elements related to growth such as land use, transportation, water, and may include a future land use map to guide land use over the planning horizon of the plan document.

The comprehensive plan provides the policy framework and guidance for the implementation of zoning. A zoning ordinance establishes regulations for the use of land and standards for development within identified zoning district boundaries. A related zoning map identifies properties that fall within different zoning categories. Zoning regulations must be uniform for each type of development throughout each district, but regulations usually differ between districts. Provisions of a zoning ordinance must be consistent with the comprehensive plan policy guidance and may be more restrictive but not less restrictive than the guidance established in the plan.

Chesapeake Bay Critical Area

The Critical Area Commission for the Chesapeake and Atlantic Coastal Bays was created as the Chesapeake Bay Critical Area Commission within the Department of Natural Resources in 1984. Initially, the Commission's charge was to adopt necessary criteria and regulations to minimize the adverse effects of human activity on the Chesapeake Bay ecosystem and guide future development. In 1985, the Chesapeake Bay Critical Area, criteria and regulations were completed. From 1985 to 1990, the Commission reviewed and approved local critical area plans for those jurisdictions required by law to have such a plan.

The Critical Area Program is a land use and resource protection program established by law to improve water quality and protect wildlife habitat in Maryland's tidal shoreline areas. The program operates through local county and municipal plans and ordinances. The law requires every Maryland jurisdiction with land in the Critical Area, to implement a Critical Area program through local ordinances, codes, plans, and policies.

The Critical Area is defined as all land within 1,000 feet of the Mean High Water Line of tidal waters or the landward edge of tidal wetlands and all waters of and lands under the Chesapeake Bay and its tributaries. Land within the Critical Area is classified as Resource Conservation Area (RCA), Limited Development Area (LDA), and Intensely Developed Area (IDA). These designations are based on land uses that existed on December 1, 1985 in the Chesapeake Bay Critical Area and on June 1, 2002 in the Atlantic Coastal Bays Critical Area.

Certain provisions of the Critical Area criteria apply throughout the Critical Area and are applied uniformly regardless of the Critical Area designation. Other provisions are specific to the land classifications of IDA, LDA and RCA; resulting in area-specific development criteria and performance standards. A description of each IDA, LDA, and RCA are provided below.

Intensely Developed Areas are where residential, commercial, institutional, and industrial developed land uses predominate and there is relatively little natural habitat. At the time of original mapping, IDAs were designated through a determination that the area had at least one of the following characteristics: a density of development equal to or greater than four dwelling units per acre; the presence of public sewer and water systems with a density of greater than three dwelling units per acre; or a concentration of industrial, institutional or commercial uses. In addition, these areas had to consist of at least 20 contiguous acres or the entire upland portion of a municipality within the Critical Area, whichever was less. Because IDAs are developed areas where there may be little or no natural habitat, the focus of the Critical Area regulations is on improving water quality through stormwater management, the use of permeable surfaces, and the preservation of existing natural forest vegetation.

Limited Development Areas are areas developed at low or moderate intensity. They also contain areas of natural plant and animal habitats, and the quality of runoff from these areas has not been substantially altered or impaired. At the time of original mapping, areas having at least one of the following features were classified as LDAs: housing density between one dwelling unit per five acres and four dwelling units per acre; areas not dominated by agriculture, wetland, forest, barren land, surface water or open space; and areas having public sewer, public water or both. Areas with IDA characteristics, but that were less than 20 adjacent acres, were classified as LDA.

Resource Conservation Areas are areas characterized by nature-dominated environments, such as wetlands, forests, and abandoned fields, and resource utilization activities, such as agriculture, forestry, fisheries, and aquaculture. At the time of original mapping, areas having at least one of the following features were classified as RCAs: a density of one dwelling unit per five acres or less; or, a dominant use of agriculture, wetland, forest, barren land, surface water, or open space.

Some development activities are not permitted in the Critical Area because of their potential to adversely affect habitat and water quality. For example, sanitary landfills and solid or hazardous waste collection or disposal facilities are not permitted in the Critical Area unless there is no environmentally acceptable alternative outside the Critical Area. In these cases, it must be demonstrated that the facilities are needed to correct an existing water quality or wastewater management problem. Local governments can also

prohibit other uses that they believe would adversely affect habitat or water quality if located within the Critical Area. Generally, the prohibition or limitation of specific uses within the Critical Area is part of a local government's zoning code or ordinance.

Economic Growth, Resource Protection, and Planning Act

The 1992 Economic Growth, Resource Protection, and Planning Act articulates Maryland's growth policy through seven visions centered on concentrating development in suitable areas, protecting sensitive areas, and establishing funding mechanisms to achieve the visions. This also requires local jurisdictions to review, and if necessary, update their plans once every six years, and to address these same visions in their comprehensive plans. All local jurisdictions, with few exceptions, incorporated these visions into their comprehensive plans on or before July 1, 1997.

The Economic Growth, Resource Protection, and Planning Act is codified in §5-7A-01 of the State Finance and Procurement Article of the Annotated Code. The Planning Visions Bill: 2009 Smart, Green, and Growing Legislation updated the planning visions with 12 new visions that address quality of life and sustainability, public participation, growth areas, community design, infrastructure, transportation, housing, economic development, environmental protection, resource conservation, stewardship, and implementation approaches. These new planning visions are the state's land use policy and a local jurisdiction is required to include the visions in the local comprehensive plan and implement them through zoning ordinances and regulations.

The Maryland Office of Planning produced a series of booklets called the *Flexible and Innovative Zoning Series* of Models and Guidelines to provide technical assistance and information to local governments about the Act.

Maryland Coastal Zone Management Program

In response to the federal CZMA, the Maryland Coastal Zone Management Program (Chesapeake & Coastal Program) was formally created in 1978 representing a unique partnership between the state and the federal government and playing a dynamic role in shaping environmental policy in the state.

The CZMA provides Maryland with the means to administer its Coastal Zone Management Program and the opportunity to work with partners at the local level to develop programs, plans and strategies to address specific coastal issues. Maryland is awarded funds based on the size of its coastal population and the length of its tidal shoreline. Maryland currently receives approximately $2.5 million annually from the NOAA Office of Ocean and Coastal Resource Management to implement the program.

Grants provided for Coastal Zone Management are generally 18 months in duration, from October 1 of one year to March 31 two years out. The total funds awarded to the program from each of these 18-month grants ranges from $4.5 to $4.7 million which includes both federal funds and a non-federal match. Under each separate contract funded projects are reimbursed for funds expended once work is completed.

The Maryland coastal zone is composed of the land, water and subaqueous land between the territorial limits of Maryland in the Chesapeake Bay, Atlantic Coastal Bays and the Atlantic Ocean, as well as the towns, cities and counties that contain and help govern the thousands of miles of Maryland shoreline. The Maryland coastal zone extends from three miles out in the Atlantic Ocean to the inland boundaries of the 16 counties that border the Atlantic Ocean (and City of Baltimore), Chesapeake Bay, and the Potomac River up to the District of Columbia. This area encompasses two-thirds of the state's land area and is home to almost 70 percent of Maryland's residents. Both of the Maryland counties involved in the NSF Dahlgren JLUS are located within Maryland's designated coastal zone.

Maryland Military Installation Council

The Maryland Military Installation Council (MMIC), originally the Maryland Military Installation Strategic Planning Council, was established in August 2003. The MMIC serves as a forum for local community, military installation, business, state agency and elected official dialogue on issues associated with Maryland's military installations. The MMIC is a division of the Maryland Department of Business and Economic Development and works to identify what public infrastructure and community support is needed for the development and expansion of Maryland's military installations and what the potential impact of that development and

expansion will be on local communities. The MMIC also researches how other jurisdictions cope with increased development around military installations and reviews state policies in order to best support the mission of the military installations and maximize economic benefits to local communities.

Maryland Renewable Portfolio Standard

The mission of the Maryland Energy Administration (MEA) is to promote affordable, reliable and clean energy. The MEA programs and policies help lower energy bills, fuel the creation of green collar jobs, address environmental and climate impacts, and promote energy independence. Clean energy can be defined as energy produced through renewable resources, such as solar, wind, geothermal, and biomass. The MEA has taken the lead in promoting the development of wind power, including offshore wind.

Maryland's Renewable Portfolio Standard requires that 20 percent (20,000 megawatts) of the state's electricity be generated from renewable energy sources (such as wind, solar, and biomass) by 2022. Beginning in 2006, electricity suppliers were required to provide 3.5 percent of retail electricity sales in the state from renewable sources. The renewables requirement increases gradually, ultimately reaching a level of 20 percent.

In 2013 the state established an offshore wind carve-out of up to 2.5 percent beginning in 2017 – the actual annual requirement to be established by the Maryland Public Service Commission (PSC). Both the solar carve-out and the offshore wind carve-out are part of the overall Tier 1 requirement. Tier 1 resources include:

- Solar.
- Wind.
- Qualifying biomass (excluding sawdust).
- Methane from the anaerobic decomposition of organic materials in a landfill or a waste water treatment plant, geothermal.
- Ocean (including energy from waves, tides, currents and thermal differences).
- Fuel cells powered by methane or biomass.
- Small hydroelectric plants (systems less than 30 megawatts in capacity and in operation as of January 1, 2004).
- Poultry-litter incineration facilities connected to the Maryland distribution grid.
- Waste-to-energy facilities.
- Facilities that use refuse-derived fuel which are connected to the Maryland distribution grid.
- As a result of 2012 legislation, certain geothermal heating and cooling systems and biomass systems that generate thermal energy also qualify as Tier 1 resources.

Tier 2 sources include hydroelectric power other than pump-storage generation. **The Maryland Offshore Wind Energy Act of 2013** created a mechanism to incentivize the development of up to 500 megawatts of offshore wind capacity, at least 10 nautical miles off of Maryland's coast.

1997 Priority Funding Areas Act

The 1997 Priority Funding Areas Act directs state funding for growth related infrastructure to Priority Funding Areas (PFAs), providing a geographic focus for state investment in growth. The PFAs are existing communities and places where local governments request state funding for future growth. Growth-related projects include most state programs that encourage growth and development such as highways, sewer and water construction, economic development assistance and state leases or construction of new office facilities. This act legislatively designated certain areas as PFAs and established criteria for locally designated PFAs. The criteria include permitted density, water and sewer availability and designation as a growth area in the jurisdiction's comprehensive plan.

The Priority Funding Area Act is codified in §5-7B of the State Finance and Procurement Article of the Annotated Code of Maryland.

Real Estate Disclosure (Southern Maryland Disclosure)

The Southern Maryland Association of Realtors has included an addendum to the standard purchase / sale contract to incorporate the following (#12 of the addendum):

> *Military Aircraft Operations. The property may be located within or near several military aircraft operation centers located in Calvert County, Charles County, Prince George's County or St. Mary's County. Properties located within or near such military aircraft operation centers may be impacted by varying degrees of noise levels and potential military aircraft accidents as well as noise from gunfire or explosive testing. The following is a description of such military aircraft operation centers; however the following list is not all inclusive:*
>
> *(A) NSF Dahlgren typically conducts flight operations five days per week, between 8 a.m. and 4 p.m. However, infrequent flight operations occur outside these times. The present level and type of operations will continue for the foreseeable future. For additional information, contact the Naval Surface Warfare Center, Dahlgren Division, Public Affairs Office.*
>
> *Buyer acknowledges that Buyer, prior to the submission of a written offer to purchase the property, is solely responsible to contact the military aircraft operation centers, as identified above, which may impact upon the property in order to ascertain the potential noise levels and accident probabilities in relation to the location of the property within or near one or more of the above military aircraft operation centers.*

Maryland Real Property Article of the Annotated Code

The Real Property Article of the Annotated Code of Maryland, Section 14-117(k), provides that a contract for the sale of residential real property shall contain a statement, if the property is subject to high noise levels from proximity to a military installation.

Maryland Department of Transportation Consolidated Transportation Program

The Consolidated Transportation Program (CTP) is the six year capital budget outlook for future transportation projects and is a key part of the State Report on Transportation (SRT) that the Maryland Department of Transportation publishes each year. The CTP includes capital projects that are generally new, expanded or significantly improved facility or service that may involve planning, environmental studies, design, right-of-way acquisitions, construction, or the purchase of essential equipment related to the facility or service. The CTP reflects the priorities of the State Administration as embodied in the updated goals of the MTP and defined by studies, evaluation and analysis. These priorities must address federal and State requirements; local government mandates, interests, and concerns; and the public travel needs. The following are the priorities embodied in the CTP.

- Supporting Economic Development and Jobs
- Transit Improvements
- System Preservation
- Smart, Green and Growing
- Transit-Oriented Development (TOD)
- Bicycle and Pedestrian Travel
- Environment
- Safety and Security
- Freight

Sustainable Growth and Agricultural Preservation Act

Also known as the Septic Law, the 2012 act is represented as a step towards smart growth for the State of Maryland. The Septic law limits septic systems that are developed onto large residential lots and establishes growth through a mapping system known as the four tiers, which highlights areas that are served by a public sewer, on-site waste disposal or septic system. Under this law, guidance is provided for local jurisdictions on where to promote growth in its rural, forested, resource and agricultural lands. For the citizens of Maryland this will allow for more predictable and accountable development. This will also help NSF Dahlgren to better assess future development impacts within the vicinity.

Local Jurisdictions

The planning tools used by the study area jurisdictions were analyzed and categorized as permanent, semi-permanent, or conditional. In Maryland and Virginia, authority to regulate land use is delegated by the state to counties and municipalities. The nature of a jurisdiction's authority to regulate local land use depends on that jurisdiction's form of local government. For instance, the "Land Use Article" of the Annotated Code of Maryland provides the legal basis for planning at the municipality and county level throughout most of Maryland. In such cases, the Article grants the authority to prepare a comprehensive or master plan, a zoning ordinance, and subdivision regulations for many of the state's municipalities. In Virginia, the Code of Virginia specifically addresses planning and zoning for cities and counties. Title 15.2 – Counties, Cities and Towns contains provisions for comprehensive plans, zoning ordinances, subdivision ordinances, and the Virginia Uniform Statewide Building Code (USBC).

The following planning tools are discussed for each jurisdiction:

- comprehensive plan;
- zoning (including lighting, height);
- building codes;
- subdivision regulations; and
- other (additional tools, as applicable).

Table 4-1 provides an overview of existing planning tools by jurisdiction and their applicability to military compatibility.

Virginia Local Jurisdiction Tools

The Code of Virginia grants local governments in Virginia the authority to prepare and adopt a comprehensive plan, zoning ordinance, and subdivision regulations. Comprehensive plans and subdivision regulations are mandatory – local jurisdictions are required to prepare and implement them by state law. The local jurisdictions have the authority to adopt a zoning ordinance but are not required to do so. King George and Westmoreland counties have both adopted a zoning ordinance.

The primary tools used by county and municipal governments in the NSF Dahlgren JLUS Study Area are the comprehensive plan and the zoning ordinance. A comprehensive plan identifies a broad vision for the community, as well as the policies, goals, and strategies deemed necessary to accomplish stated objectives. A zoning ordinance is used to implement comprehensive plan recommendations through development standards, generally organizing community elements in a rational orderly framework.

Table 4-1. County and Town Planning Tools

Jurisdiction	Comprehensive Plan	Zoning Code Height Restrictions	Zoning Code Density	Zoning Code Sound Attenuation	Zoning Code Outdoor Lighting	Subdivision Regulations	Special Area Plans	Building Codes
King George County, VA								
Westmoreland County, VA								
Town of Colonial Beach, VA								
Charles County, MD								
St. Mary's County, MD								

Legend:

- = The tool exists but does not address land use issue(s) related to Military Compatibility.
- = The tool exists but only partially addresses land use issue(s) related to Military Compatibility.
- = The tool exists and addresses land use issue(s) related to Military Compatibility.
- = The tool exists, but does not affect land use issue(s) related to military compatibility as adopted.
- = The jurisdiction does not employ this tool.

These tools are supplemented in some jurisdictions by special area plans, where additional development guidelines are established unique to the special conditions or circumstances of a particular geographic area. Building codes provide building-specific regulations to ensure the health, safety and welfare of occupants within a structure and may include performance standards for sound attenuation between the exterior environment and interior spaces.

King George County, VA

The following is a review of the existing planning tools (policies, programs, and plans) utilized by King George County along with a brief analysis identifying their ability to address land use and military compatibility, and where potential improvements can be made.

King George County Comprehensive Plan

The King George County Comprehensive Plan is the policy document that guides the long range development plans of the county, as mandated by §15.2-2223 of the Code of Virginia. It contains the goals and objectives upon which the county officials base their long-range decisions regarding development within the county. The most recent Comprehensive Plan, adopted in April 2013, contains elements outlining population and economy, land use, cultural and natural resources, transportation, community facilities, and services and utilities. The guidelines outlined in the Comprehensive Plan are important because of their potential impacts on operations at NSF Dahlgren, which is located within the county and one of its designated growth zones.

A review of the Comprehensive Plan has identified the following related to military compatibility:

- The County Comprehensive Plan considers the Dahlgren community a "Primary Settlement Area," – a priority location to accommodate future population and employment growth.
- The Plan encourages and supports the continued stability of the Navy activities at NSF Dahlgren; however, the recommendation of increased growth in the Dahlgren Primary Settlement Area may be incompatible with the mission at NSF Dahlgren.
- There are no noise, lighting, frequency or vibration provisions associated with compatibility of military missions addressed in the plan.
- There are no goals, objectives or action items for achieving military compatibility, aside from the statement of support for the continued stability of Navy activities at NSF Dahlgren and consideration of missions in land use decisions.

Source: King County Comprehensive Plan, 2013

King George County Zoning

King George County, in general, is zoned limited agriculture, rural agriculture, or general agriculture with small pockets of residential and commercial in established communities. Of relevance to the JLUS is the additional residential and commercial zoning in the Dahlgren Settlement Area. Zoning ordinances are considered semi-permanent tools because they can be amended.

The following aspects of compatibility planning are addressed within the King George County Zoning Ordinance:

- Zoning does not address density proximate to NSF Dahlgren or its operational areas. The zoning around the western perimeter of NSF Dahlgren consists of mostly residential zoning to the southwest and commercial zoning to the northwest. The ordinance requires a minimum lot size of 15,000 sq. ft. for R-1 to R-3 and requires a minimum lot size of 5,000 sq. ft. C-1 and C-2. These districts may be incompatible with operations at NSF Dahlgren since they would introduce additional noise sensitive uses to the immediate area, add to traffic along area roads, and potentially be sited within safety areas associated with NSF Dahlgren flight operations.

- There are no provisions related to military compatibility, e.g., noise, lighting, vibration, or height.
- The zoning requirements do not require the delineation of noise contours on official maps or plan submittal maps, as applicable.
- Telecommunications facilities are restricted to a height of 199 feet; however, this height may be exceeded with the approval of a special exception permit.

Source: King George County Zoning Map 2012, King George County Zoning Ordinance, 2008 (pp.18-43)

King George County – Building Codes

Building codes are intended to regulate building construction, materials, alteration and occupancy to ensure health, safety and welfare. Building codes, similar to other regulatory tools, are considered semi-permanent because they may be amended. King George County has adopted the following codes as amended:

- Virginia Construction Code, 2012
- International Fuel Code, 2009
- International Plumbing Code, 2009
- International Mechanical Code, 2009
- International Residential Building Code, 2009
- International Energy Code, 2009
- International Electric Code, 2009

Chapter 12, Interior Environment, of the 2012 Virginia Building Code addresses sound transmission in internal building environments. Section 1207.4 of the Code specifically provides standards for noise attenuation to mitigate airport noise in indoor environments. The intent of the Code section is to ensure that structures are designed and constructed so as to limit the interior noise level to no greater than 45 A-weighted decibels (dBA) for the Day Night Average Sound Level (Ldn). This can be accomplished either through the use of noise reducing components incorporated into the building construction or through alternative site design using exterior structures, terrain and permanent plantings. Where the Ldn is between 65 and 69 dBA, exterior walls and roof/ceiling assemblies must provide a sound transmission class (STC) of 45 dBA and windows and doors must provide an STC of 25 dBA. Where the Ldn is between 70 and 74 dBA, exterior walls and roof/ceiling assemblies must provide an STC of 44 dBA and windows and doors must provide an STC of 33 dBA. Where the Ldn is greater than 75 dBA, exterior walls and roof/ceiling assemblies must provide an STC of 49 dBA and windows and doors must provide an STC of 38 dBA.

King George County Subdivision Ordinance

The King George County Subdivision Ordinance, adopted in 2011, regulates the creation, sale, conveyance, and recordation of all new parcels within the County. The Subdivision Ordinance requires compliance with all zoning regulations and consistency with the Comprehensive Plan.

A review of the subdivision regulations has identified the following related to military compatibility:

- There are no provisions related to military compatibility, e.g. noise, lighting, vibration, or height.
- The Ordinance does not require the delineation of noise contours, where applicable.

Town of Colonial Beach

The following is a review of the existing planning tools (policies, programs and plans) utilized by the Town of Colonial Beach along with a brief analysis identifying the ability to address land use and military compatibility.

Town of Colonial Beach Comprehensive Plan

The Town of Colonial Beach 2009 Comprehensive Plan contains a community profile, existing conditions and analysis, goals and objectives, future land use plan, implementation element, and environmental addendum.

The following items concerning military compatibility are based on a review of the Comprehensive Plan:

- Comprehensive Plan Chapter 6 addresses future growth concentrated along the shoreline from an environmental perspective, but does not reference compatibility with NSF Dahlgren range operations.
- The plan does not address the military presence from a land use compatibility perspective.
- There are no noise, lighting, frequency, or vibration provisions associated with compatibility of the NSF Dahlgren mission in the Plan.

Town of Colonial Beach Zoning Ordinance

The Town of Colonial Beach Zoning Ordinance was adopted in 1981 and last amended in 2009. The Ordinance regulates height, setbacks, residential density, and non-residential intensity. Since the town's major economic industry is tourism, zoning focuses mainly on commercial and residential uses. A review of the Zoning Ordinance reveals the following areas of interest related to military compatibility:

- The zoning ordinance specifies minimum lot sizes of 12,000 square feet in R-1 and 5,000 sq. ft. minimums in R-2 through R-4 zoning as well as the CR (Commercial-Residential), which occupies most of the area along the shoreline of the Potomac River. These uses may be incompatible with operations at NSF Dahlgren due to the noise and vibration caused by testing operations.
- There are no provisions related to military compatibility, e.g. noise, vibration, or height.
- The zoning regulations do not require the delineation of noise contours on official town maps or plan submittal maps, as applicable.

Town of Colonial Beach Subdivision Ordinance

The Colonial Beach Subdivision ordinance regulates the creation, sale, conveyance, and recordation of all new parcels within the town and requires compliance with the Zoning Ordinance and consistency with the Comprehensive Plan.

A review of the subdivision regulations has identified the following related to military compatibility:

- The subdivision ordinance does not address density proximate to the Middle Danger Zone.
- There are no provisions related to military compatibility, e.g. noise, lighting, vibration or height.
- The requirements do not require the delineation of noise contours, where applicable.
- The approval process does not require notification to future property owners purchasing land in a subdivision that may be impacted by noise and vibration.

Building Code

The Town of Colonial Beach follows the 2012 Virginia Uniform Statewide Building Code.

Chapter 12, Interior Environment, of the 2012 Virginia Building Code addresses sound transmission in internal building environments. Section 1207.4 of the Code specifically provides standards for noise attenuation to mitigate airport noise in indoor environments. The intent of the Code section is to ensure that structures are designed and constructed so as to limit the interior noise level to no greater than 45 A-weighted decibels (dBA) for the Day Night Average Sound Level (Ldn).

While this tool is specific to mitigating airport noise, because the performance standards for sound attenuation are predicated on achieving internal sound levels (independent of the source), this section of the Code could be amended or incorporated in the zoning regulations by amendment to the to apply to areas proximate to the Potomac River Testing Range with an Ldn greater than 65 dBA.

Town of Colonial Beach Business District Revitalization Plan

The Town of Colonial Beach adopted a Business District Revitalization Plan in 2010 to guide development in the Business District, but also in areas that influence it. The Plan was developed to guide the future of the community and revitalize the town's historic commercial area. The Plan highlights the importance of Dahlgren to region growth and the rich relationship that the

town of Colonial Beach has built with NSF Dahlgren in the long-term. A review of the plan has identified the following related to military compatibility:

- Though NSF Dahlgren is mentioned as a regional employer, and an important stakeholder, the plan does not discuss compatibility with Dahlgren in its goals or objectives.
- The plan recommends unique street lighting features which have not been identified as "dark-sky" compliant.
- There is no discussion regarding noise, lighting, frequency or vibration issues associated with compatibility to the NSF Dahlgren mission.

Colonial Beach Foundation

The Colonial Beach Foundation evolved from a Chamber of Commerce citizen's "Vision Committee." The committee was formed in early 2004, and consisted of forty-five committed area residents to develop a **Vision for the Future of Colonial Beach**. Currently, the Colonial Beach Foundation is a highly organized non-profit 501 (c)(3) corporation. Goals of the Foundation include projects to improve the quality of life for the citizens of our community and continuing to promote cooperation and involvement of residents of all ages in the stewardship of the town.

Westmoreland County, VA

The following is a review of the existing planning tools (policies, programs and plans) utilized by Westmoreland County along with a brief analysis identifying their ability to address land use and military compatibility.

The Westmoreland County Comprehensive Plan

The Westmoreland County Comprehensive Plan is the policy document that guides the long range development plans for the county and established criteria and guidelines for land use regulation and growth policies for the unincorporated areas of the County. The 2010 update of the Comprehensive Plan contains elements outlining economy, land use, natural resources protection, transportation, and implementation and evaluation of the plan. A review of the Comprehensive Plan reveals the following areas of interest related to military compatibility:

- The Plan does not address the military presence from a land use compatibility perspective.
- There are no references to impacts or compatibility relative to NSF Dahlgren operations.

Westmoreland County Zoning Ordinance

The Westmoreland County Zoning Ordinance divides the county into base zoning districts that include agricultural, rural, village, residential, commercial, marine commercial, and industrial. Overlay zones are also incorporated such as the Chesapeake Bay Area Overlay District, to address development and water quality issues.

Although NSF Dahlgren operations are not specifically identified within the County's Zoning Ordinance, the following provisions are relevant to compatibility with NSF Dahlgren.

- The maximum building height allowed by the Westmoreland County Zoning Ordinance is 45 feet for most buildings, measured to the highest point of the roof. Different height regulations are allowed for the following structures:
  - Rooftop antennas have a maximum height 125 feet.
  - Telecommunication monopoles and towers have a maximum height 150 feet.
  - Agricultural structures, cupolas, chimneys, flag poles, water tanks, monuments, and necessary mechanical accessories, as well as utility structures in the industrial zone are not subject to a maximum height.
- The Zoning Ordinance includes standards for noise generated by particular industrial and other uses; however, provisions associated with aircraft overflight or range activities are not addressed.
- Windmills are a permitted accessory use in all districts subject to the height regulations of the district in which they are erected (typically restricted to 45 feet in height).

- Wind turbines are not specifically identified within the Zoning Ordinance but may be considered a public utility or system component and approved throughout the county by special exception by the Board of Supervisors. There are no height provisions relating to wind turbines.

Westmoreland County – Building (Uniform Construction Code—UCC)
The Westmoreland County Zoning Ordinance follows the 2012 Virginia Uniform Statewide Building Code.

Chapter 12, Interior Environment, of the 2012 Virginia Building Code addresses sound transmission in internal building environments. Section 1207.4 of the Code specifically provides standards for noise attenuation to mitigate airport noise in indoor environments. The intent of the Code section is to ensure that structures are designed and constructed so as to limit the interior noise level to no greater than 45 A-weighted decibels (dBA) for the Day Night Average Sound Level (Ldn).

While this tool is specific to mitigating airport noise, because the performance standards for sound attenuation are predicated on achieving internal sound levels (independent of the source), this section of the Code could be amended or incorporated in the zoning regulations by amendment to the to apply to areas proximate to the Potomac River Testing Range with an Ldn greater than 65 dBA.

Maryland Local Jurisdiction Tools

Comprehensive plans capture how people want their communities to function and grow. In Maryland, local jurisdictions are required to review and, if necessary, update their comprehensive plans every ten years. The Maryland Department of Planning offers technical assistance for these updates. The Land Use Article of the Annotated Code of Maryland outlines different elements that the comprehensive plan must address and gives the planning commission the authority to include additional elements not required by Land Use Article.

Charles County, MD

The following is a review of the existing planning tools (policies, programs and plans) utilized by Charles County along with a brief analysis identifying their ability to address land use and military compatibility.

Charles County Comprehensive Plan
The Charles County Comprehensive Plan was adopted in 2006 and undergoing and update as of November 2014. The Comprehensive Plan is the policy document that guides the long range development plans of the county. The 2014 version of the Plan addresses issues relating to land use, water resources, natural resources, energy conservation, economic development, transportation, community facilities and services, community development, and zoning. A review of the comprehensive plan has identified the following related to military compatibility:

- Land use planning efforts have been focused primarily on rural conservation, and while these efforts aid in compatibility to some extent, there are proposed residential and mixed use “villages” near the shore of the Potomac River proximate to the Middle Danger Zone.

- There are no noise, lighting, frequency or vibration references to compatibility with NSF Dahlgren operations.

Source: Draft Charles County Comprehensive Plan, 2014

Charles County–Zoning

Charles County's Zoning Ordinance is the primary tool available to implement the land use policies established in the Comprehensive Plan. Zoning in Charles County is composed of base districts (rural, residential, commercial, mixed use, industrial and village zones) and planned development zones, which allow higher intensity and mixed used development with additional review. Charles County also employs overlay zones to address the appearance of highway corridors and protection of environmental resources.

The Charles County Zoning Ordinance contains the following provisions associated with compatibility planning:

- Maximum structure heights established by the Zoning Ordinance range from 36 to 60 feet for most uses. Potential heights up to ten stories are permitted within the Waldorf and Acton Activity Centers though these areas and uses are not proximate to NSF Dahlgren. Communication towers, antennas, and certain other structures are considered exceptions to the height restrictions.
- The zoning regulations do not address airport noise, although adoption of the overlay zone recommended in the Comprehensive Plan could address this issue.

Charles County Building Code

Charles County has adopted the 2012 editions of following codes as amended by periodic supplements and Charles County Bill No. 2012-09:

- International Building Code
- International Residential Code
- International Mechanical Code
- International Energy Code

Charles County has adopted the 2012 editions of following codes

- International Existing Building Code
- International Plumbing Code
- International Fuel Gas Code
- International Property Maintenance Code

Charles County has adopted the 2011 edition of the National Electrical Code.

The Charles County Building Code does not include provisions for sound attenuation as it relates to sound transmission from external noise sources to the internal spaces within a building.

Charles County Subdivision Regulations

The Charles County Subdivision ordinance, most recently updated in December 2013, regulates the creation, sale, conveyance, and recordation of all new parcels within the county. The subdivision ordinance requires compliance with all zoning regulations and consistency with the Comprehensive Plan.

St. Mary's County, MD

The following is a review of the existing planning tools (policies, programs and plans) utilized by St. Mary's County along with a brief analysis identifying their ability to address land use and military compatibility.

St Mary's County Comprehensive Plan

St. Mary's County's current Comprehensive Plan was most recently updated in 2010 with the goal of preserving and enhancing the character of St. Mary's County and improving the quality of life for its citizens while managing the pace of growth and development. The Comprehensive Plan incorporates the state's 12 visions addressing quality of life and sustainability, public participation, growth areas, community design, infrastructure, transportation, housing, economic development, environmental protection, resource conservation, stewardship, and implementation approaches.

Because Naval Air Station Patuxent River is located within St. Mary's County, the provisions of the Comprehensive Plan are geared towards compatbility between this Navy installation and the surrouding communities. The Comprehensive Plan does not consider compatibility with NSF Dahlgren nor does it acknowledge the Potomac River Test Range on it's southern border.

The St. Mary's County Comprehensive Plan recommends rural residential and rural preservation land uses near the Middle Danger Zone, and small core of industrial activity on the southwestern peninsula near the Piney Point Airport. The preservation of rural lands and a rural lifestyle in this area is compatible with military operations in the Middle Danger Zone.

St Mary's County Zoning Ordinance

St. Mary's County's Zoning Ordinance is the main tool available to implement the land use policies established in the Comprehensive Plan. Zoning in St. Mary's County is composed of base districts (rural and residential, commercial and mixed use, industrial and office, and commercial marine) which correspond to general categories of land use covering most of the county and special districts intended to accommodate specific uses due to their unique conditions.

The following components relate to specific aspects of St. Mary's County's Zoning Ordinance related to compatibility with NSF Dahlgren:

- The code specifies that electromagnetic and electrical interference are not allowed to be produced by any use affecting normal off-site radio, telephone or television reception, but does not specify affecting military operations.

St. Mary's County Building Code

St. Mary's County has adopted the 2009 editions of the following codes:

- International Building Code
- International Fuel Code
- International Plumbing Code
- International Mechanical Code
- International Residential Building Code
- International Energy Code
- International Electric Code

The St. Mary's County Building Code does not include provisions for sound attenuation as it relates to sound transmission from external noise sources to the internal spaces within a building.

St. Mary's County Subdivision Ordinance

The St. Mary's County Subdivision ordinance adopted in August, 2010, regulates the creation, sale, conveyance, and recordation of all new parcels within the county. The subdivision ordinance requires compliance with all zoning regulations and consistency with the comprehensive plan.

Regional Plans and Tools

George Washington Regional Commission

The George Washington Regional Commission (GWRC) was established in 1961 and is the planning district commission for King George County and four other Virginia jurisdictions (Caroline, Spotsylvania and Stafford counties and the City of Fredericksburg) outside the JLUS Study Area. The Commission comprises elected officials and citizens appointed by member local governments with a mission to coordinate planning to ensure economic competitiveness, reduce redundancy in government, improve efficiency, enhance services, and improve implementation time of regional projects. The GWRC provides a broad array of planning services benefitting the region – the fourth largest and fastest growing planning district in the Commonwealth of Virginia, including: regional environmental, energy-conservation, hazard mitigation and rural transportation planning programs; and operation of GWRideConnect –the region's nationally-recognized

rideshare that facilitates and promotes vanpooling and transit use. The GWRC also provides technical and program services to local governments including grant application assistance, management services for program implementation, land use planning services, and mapping. The GWRC serves as an Affiliate State Data Center for the region, providing input for state agencies, commissions, the Commonwealth Intergovernmental Review Process, and a strategic plan to promote orderly and efficient development through goals, objectives, and defined metrics.

Northern Neck Planning District Commission

The Northern Neck Planning District Commission (NNPDC) is the regional planning organization and economic development agency for the Northern Neck region of Virginia including Westmoreland County and the Town of Colonial Beach. It is a voluntary association of local governing bodies that serves to address local issues and to solve problems with regional significance and impact through mutual cooperation. Regional programming includes intergovernmental coordination, review and assistance, economic development activities, transportation planning, grant program identification and applications, environmental planning and local requests. The NNPDC also established the Northern Neck Chesapeake Bay Region Partnership (NNCBRP), a public-private partnership. The NNPDC plans and programs include:

- 2035 Rural Long Range Transportation Plan (in conjunction with VDOT)
- 2013 Northern Neck Comprehensive Economic Development Strategy
- Northern Neck Planning District Regional Water Supply Plan
- Virginia's Northern Neck Stronger Economies Together (SET) Initiative

Northern Neck Tourism Commission

The Northern Neck Tourism Commission (NNTC) was formed under the support of the Northern Neck Chesapeake Bay Region Partnership. Representing five historic counties and businesses within the Northern Neck, the NNTC promotes the sites and attractions of the region capitalizing on natural, historical, cultural and recreational resources. The NNTC also works with local travel organizations and county and town governments to increase travel to the Northern Neck and attract tourists to the area. The Northern Neck Tourism Plan was approved in January 2011 and includes tourism goals, objective, measures, targets, and initiatives for the NNTC.

Northern Neck Land Conservancy

The Northern Neck Land Conservancy is a non-profit land trust in the Northern Neck of Virginia. The Conservancy helps landowners who want to voluntarily protect their lands with permanent conservation easements to ensure that their property sustains the rural character of the Northern Neck and maintains a healthy environment for future generations. The Northern Neck Land Conservancy has four working goals:

- Conserving open space on the Northern Neck to protect the Chesapeake Bay and its watersheds.
- Preserving the Northern Neck's unique historical sites and rural heritage.

- Encouraging responsible stewardship of the Northern Neck natural environment by residents and visitors.
- Maintaining an effective organization to ensure mission success.

Northern Neck Chesapeake Bay Public Access Authority

The Northern Neck Chesapeake Bay Public Access Authority (NNCBPAA) was created to identify land that can be secured or purchased for use by the general public as a public access site. Once acquired, the Authority determines the appropriate public-use level for each site. The NNCBPAA completed the Regional Shallow-Draft Navigation and Sediment Management Plan for the Northern Neck of Virginia in 2011 to estimate a probable average annual cost for maintaining the federal navigation channels within the geographic boundaries of the Public Access Authority.

Potomac River Fisheries Commission

The Potomac River Fisheries Commission is the Maryland-Virginia bi-state regulatory authority for fishery matters in the mainstream tidal Potomac River from Washington, DC to the Chesapeake Bay. The Commission is comprises eight members – four appointed by the governor of Maryland and four appointed by the governor of Virginia. The Commission is responsible for adopting the rules, regulations and licenses for the recreational and commercial taking, catching or attempting to take or catch fish, crabs, oysters and clams from the Potomac River.

Other References

In the interest of land use compatibility between the military and the local community, the DOD Office of Economic Adjustment (OEA) and other public interest groups, such as the National Association of Counties (NACo), have prepared educational documents and videos that educate and inform the public about encroachment issues and methods that can be used to address existing or future compatibility concerns. Five resources that have been published to inform the public on land use compatibility are identified as follows:

Guides

The Practical Guide to Compatible Civilian Development near Military Installations (July 2007), OEA

This guide offers general information on community development and civilian encroachment issues. The guide can be found at: http://www.oea.gov/.

Joint Land Use Study Program Guidance Manual (November 2006)

This manual provides guidance on the JLUS program, process, and efforts to support compatible development. This manual can be obtained on the OEA internet site at the following address: http://www.oea.gov/.

Encouraging Compatible Land Use between Local Governments and Military Installations: A Best Practices Guide (April 2007), NACo

This guidebook presents case studies of best practices between the military and communities through communication, regulatory approaches, and Joint Land Use Studies. The guide can be accessed on the NACo internet site at the following address: http://www.naco.org/.

Videos

The Base Next Door: Community Planning and the Joint Land Use Study Program, OEA

This informative video discusses the issue of encroachment near military installations as urban development occurs within the vicinity. This video can be accessed on the official OEA YouTube channel at: http://www.youtube.com/watch?v=6UiyWDgLeJM

Managing Growth, Communities Respond, OEA

This video highlights the lessons learned from three communities (Kitsap Naval Base in Bangor, Washington; Fort Drum in Jefferson County, New York; and Fort Leonard Wood in Pulaski County, Missouri) that have successful programs for managing growth near their respective military installations. This video can be accessed on the official OEA YouTube channel at: http://www.youtube.com/watch?v=rea6d3bDp3c

Please see the next page.

5. Compatibility Assessment

Inside Chapter 5 ...

Introduction

Compatibility, in relation to military readiness, can be defined as the balance or compromise between community needs and interests and military needs and interests. The goal of compatibility planning is to promote an environment where both community and military entities communicate, coordinate, and implement mutually supportive actions that allow both to achieve their respective objectives.

A number of factors assist in determining whether community and military plans, programs, and activities are compatible or in conflict with joint land uses such as community activities and military installations. For this Joint Land Use Study (JLUS), 25 compatibility factors were reviewed to identify, determine, and establish a set of key study area issues. These compatibility factors are listed below.

COMPATIBILITY FACTORS

AQ	Air Quality	LAS	Land / Air / Sea Spaces
AT	Anti-Terrorism / Force Protection	LU	Land Use
BIO	Biological Resources	LEG	Legislative Initiatives
CA	Climate Adaptation	LG	Light and Glare
COM	Coordination / Communication	MAR	Marine Environments
CR	Cultural Resources	NOI	Noise
DSS	Dust / Smoke / Steam	PT	Public Trespassing
ED	Energy Development	RC	Roadway Capacity
FSC	Frequency Spectrum Capacity	SA	Safety Zones
FSI	Frequency Spectrum Impedance / Interference	SNR	Scarce Natural Resources
		VO	Vertical Obstructions
HA	Housing Availability	V	Vibration
IE	Infrastructure Extensions	WQQ	Water Quality / Quantity

An action undertaken by either the military or community that minimizes, hinders or presents an obstacle to the action of the other is characterized as an issue. Issues arising on the part of either or both the military and community are grouped according to the relevant factor and listed in this section. For each identified issue, a compatibility assessment is provided discussing the nature and cause or source of the issue followed by applicable existing tools currently used or that may be used to mitigate encroachment or prevent the emergence of encroachment in the future including an assessment of their effectiveness.

Methodology and Evaluation

The methodology for the NSF Dahlgren JLUS consisted of a comprehensive and inclusive discovery process to identify key stakeholder issues associated with the compatibility factors. At the initial Policy Committee (PC) and Technical Advisory Group (TAG) workshops and public meetings, stakeholders were asked to identify the location and type of issue in conjunction with compatibility factors they thought existed today or could occur in the future. As a part of the evaluation phase, the PC, TAG, and the public examined and prioritized the extent of existing and potential future compatibility issues that could impact land within or near the Study Area. Other factors and associated issues were analyzed based on available information and similarity with other community JLUS experiences around the country.

The selection and inclusion of strategies is directly and indirectly affected by the evaluation of issues. Issues were prioritized into four different categories with an associated time frame and presented to the PC and TAG for review. Since the PC and TAG accepted the priorities as is, the priorities will be used to determine the timeframe for initiating strategies by the primary and partner agencies.

When reviewing the assessment information in this chapter, it is important to note the following:

- This chapter provides a technical background on the factors and issues discussed based on available information. The intent is to provide an adequate context for awareness, education, and development of JLUS recommendations. It is not designed or intended to be utilized as an exhaustive technical evaluation of existing or future conditions within the study area.
- Of the 25 compatibility factors, 9 were determined to be inapplicable to this JLUS and are not discussed in this chapter:
    - Air Quality
    - Anti- Terrorism / Force Protection
    - Cultural Resources
    - Dust / Smoke / Steam
    - Frequency Spectrum Capacity
    - Marine Environments
    - Scarce Natural Resources
    - Vertical Obstructions
    - Water Quality / Quantity
- Each issue has an accompanying set of existing tools. These existing tools are meant to show the reader what is currently in place that affects the specific compatibility issue. Existing tools will not always aid compatibility but can offer a certain relevancy that can be built off of to help create strategies for future implementation.

Biological Resources

Biological resources include federal and state listed species (threatened and endangered species) and their habitats. These resources may also include areas such as wetlands and migratory corridors that are critical to the overall health and productivity of an ecosystem. The presence of sensitive biological resources may require special development considerations and should be included early in the planning process.

Compatibility Assessment

Issue BIO-1	**Bald Eagles Nesting Sites Necessitate Military Workarounds.** Several bald eagle nesting sites are located on and near NSF Dahlgren. Increased development could induce more bald eagles nests on or near the installation, potentially resulting in workarounds to avoid disturbing these sites.

Bald eagles (*Haliaeetus leucocephalus*) generally nest near water bodies (e.g., coastlines, rivers, lakes, or streams) that can provide an adequate food supply. Eagles forage in open water, including the Potomac River Test Range (PRTR). The bald eagle was originally listed as a national endangered species under the Endangered Species Act (ESA) and upgraded to "threatened" in July 1995, due in large to increases in eagle populations. Although the bald eagle was delisted from the federal threatened and endangered species list on July 28, 2007, it is still a protected species and is protected by the Bald and Golden Eagle Protection Act of 1940 (BGEPA) which prohibits the taking, possession, and commerce of eagles. Eagles are also protected at the national level by the Migratory Bird Treaty Act. While the state of Maryland removed bald eagles from their threatened species list in 2010, it remains on Virginia's list as a threatened species under Virginia law and pursuant to Virginia Department of Game and Inland Fisheries (VDGIF) regulations.

Despite a recent population increase, species protection still suffers due to habitat destruction, environmental contaminants and encroachment from urban areas. According to US Fish and Wildlife Service (USFWS), human disturbance has been linked to reduced nest success and productivity. With development from local communities encroaching on bald eagle nesting locations resulting in habitat loss, NSF Dahlgren lands may take on additional populations of eagles taking refuge.

Operations at NSF Dahlgren have the potential to greatly affect the local bald eagle population due to the number of nesting sites proximate to the installation, along the Potomac River. Successful bald eagle nests are located near open water and tall mature trees. Therefore, naval actions on the PRTR must take into consideration any adverse impacts from military operations on eagle nesting sites, as well as any potential impacts on military operations caused by these nesting sites.

According to the Center for Conservation Biology, as of 2013, there are ten known bald eagle nests located on NSF Dahlgren, four nests located at Mainside and six nests located at Pumpkin Neck Annex (also known as the Explosive Experimental Area). There are approximately ten additional nests located in Virginia within a two-mile radius from NSF Dahlgren, and roughly 50 nests located along the Virginia coastline adjacent to the PRTR, although these have not been validated since 2011. Bald eagle nesting site locations for Maryland as reported by the state Department of Natural Resources are outdated, but a large population of eagles is assumed to occupy the Maryland coastlines. As development decreases the availability of habitat along these coastlines, the number of eagles nesting at NSF Dahlgren land may increase creating an "island" of nesting habitat.

The greatest known concentration of bald eagles in the region is located in the area north of NSF Dahlgren and further down the shoreline in Westmoreland County, primarily affecting Mainside and the Upper Danger Zone (UDZ) and Middle Danger Zone (MDZ) of the PRTR. It is important to maintain awareness of the location and vulnerability of the nesting sites when considering future development on NSF Dahlgren to preserve this threatened species and prevent potential conflicts with military operations.

In addition to following state and federal regulations, NSF Dahlgren follows the guidelines in its 2007 Bald Eagle Management Plan. To ensure protection of the species at NSF Dahlgren, the Natural Resources Office conducts bald eagle management on and around the installation involving the protection and monitoring nesting habitat and enforcing the Bald Eagle Protection Guidelines for Virginia.

Source: NSF Dahlgren Draft Environmental Impact Statement, 2012; http://www.ccbbirds.org/; NSF Dahlgren Bald Eagle Management Plan, 2007

Existing Tools

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940 makes it unlawful to take, kill, transport, capture, possess, or disturb bald or gold eagles without a permit, where "disturb" includes any activities which interfere with normal habits, causing injury, death, or nest desertion. This comprises any human alterations around a previously used nest site. Bird parts, nests, and eggs are also protected as part of this act. Eagles are specifically protected furthermore in the Migratory Bird Treaty Act and the Lacey Act.

Source: http://www.fws.gov/laws/lawsdigest/BALDEGL.HTML

Migratory Bird Treaty Act

The Migratory Bird Treaty Act was originally enacted in 1916 to implement conventional measures for the protection of migratory birds. The act, which covers over 800 species, makes it unlawful without a permit or waiver to pursue, hunt, capture, kill, take or sell any of the migratory birds listed therein, including bald and golden eagles. Again, this act also covers bird parts, eggs and nests and does not discriminate between live or dead birds. There are some exceptions to this act, such as the Eagle Feather Law, which are aimed at regulating the possession or transportation of eagles (or other birds) and / or their parts or nests primarily for scientific, educational and depredation control purposes, or even religious purposes.

Source: http://www.fws.gov/laws/lawsdigest/migtrea.html

Lacey Act

The Lacey Act is one of the country's first conservation laws, which ultimately prohibits trading of wildlife, fish, and plants that have been illegally taken, possessed, transported or sold. It authorizes the Secretary of Interior to aid in restoring game and birds in parts of the U.S. where they have become extinct or rare. This act is still in effect and works in conjunction with other federal conservation laws regarding wildlife such as migratory birds and / or eagles.

Source: http://www.fws.gov/international/laws-treaties-agreements/index.html

Bald Eagle Post-Delisting Monitoring Plan

The Post-Delisting Monitoring Plan was created by the USFWS in March of 2009 to monitor the status of the bald eagle and ensure continued success as a species. The monitoring will be done by collecting data on occupied nests to detect any change of 25 percent or greater. If declines are detected, an investigation will be conducted to find the cause and may result in increased monitoring, additional research, or reestablishing protection of the species under the Endangered Species Act. If reestablished, that would affect military operations at NSF Dahlgren.

Source: http://www.fws.gov/midwest/eagle/protect/FinalBAEA_PDMPlan.html

Bald Eagle Protection Guidelines for Virginia

These guidelines established by the Virginia Field Office of the USFWS include several initiatives to help protect eagles including bald eagle protection zones around nests. Any deviation from previous activities in the protection zone must be approved by the USFWS. Activities include actions during nesting season (December to July) or permanent landscape changes. Additional conservation activities include a forestry program to promote diverse and healthy forests and Special Interest Areas with quality or unique habitat conditions (primarily established for bald eagle habitat protection). Nine of the ten bald eagle nests located at NSF Dahlgren are within military operating and test range areas. A future assessment will assess potential mitigation measures to minimize the test range activities impact on bald eagles.

Source: http://www.dgif.virginia.gov/wildlife/laws/

Naval Support Facility Dahlgren Integrated Natural Resources Management Plan

The NSF Dahlgren Integrated Natural Resources Management Plan (INRMP) was developed in 2001 to document the natural resources program and management at NSF Dahlgren. Bald eagles are included in the "Rare Species" and "Sensitive Ecosystems" sections of the plan. The plan documents the occurrence of eagles on the installation along with its nesting habitat. Guidelines to manage and protect the bald eagle habitat include monitoring, protection procedures such as buffer zones, and the consultation process. These guidelines are included as a Fish and Wildlife Goal. Appendix G of the Plan is the VDGIF state protection guidelines for bald eagles.

Source: http://www.navsea.navy.mil/nswc/dahlgren/RANGE/StewNatRes.pdf

Naval Support Facility Dahlgren Bald Eagle Management Plan

The 2007 Bald Eagle Management Plan provides an overview of the bald eagle history, habitat and protection, the bald eagle activity at NSF Dahlgren, current management practices, and future conservation actions. The main goal of the plan is to preserve the existing bald eagle nesting pairs through management and conservation of current and future habitats. Some conservation goals include providing multiple (and adequate) nest and perch tree sites as well as maintaining a visual barrier of vegetation between the eagles and adjacent human use areas. The plan also includes specific management practices related to forestry, hunting, construction, research and testing activities, and aircraft operations. Additionally, the plan identifies pertinent laws and regulations for the protection of Bald Eagles, which is important for state and federal compliance. These laws and regulations include all of the aforementioned acts and regulations in this section.

Source: NSF Dahlgren Bald Eagle Management Plan, 2007

Findings

- The INRMP and the Bald Eagle Management Plan are both outdated. Updates should detail the de-listing of the species, as well as the USFWS de-listing monitoring plan and base coordination with VDGIF.
- The Bald Eagle Protection Guidelines for VA, as well as the NSF Dahlgren documents on Bald Eagles do not properly address the PRTR impacts from eagles, and on eagles in the different zones.
- There are several federal laws in place to protect eagles, although there is little to no evidence of military management and enforcement of these laws in or around NSF Dahlgren and its associated ranges.
- The Bald Eagle Management Plan for NSF Dahlgren was developed before the Bald Eagle was delisted from endangered and threatened species list in July 2007 and may not include mention of that fact.

Climate Adaptation

Climate adaptation is attempting to mitigate the potential impacts caused by climate change, which is the gradual shift of global weather patterns and temperature resulting from natural factors and human activities (e.g. burning of fossil fuels) that produce long-term impacts on atmospheric conditions. The effects of climate change vary and may include fluctuations in sea levels, alterations of ecosystems, variations in weather patterns, and natural resource availability issues. The results of climate change, i.e. ozone depletion and inefficiencies in land use, can present operational and planning challenges for the military and communities as resources are depleted and environments altered.

Compatibility Assessment

Issue CA-1	**Sea Level Rise.** Due to the coastal location of NSF Dahlgren, there are potential implications of sea level rise and associated impacts to the NSF Dahlgren mission and operations.

NSF Dahlgren and the PRTR are located adjacent to and within the Potomac River and Chesapeake Bay. Increased frequencies and intensities in storms can result in localized flash flooding and impact operational capability. Flooding can impede personnel access to NSF Dahlgren, create operational delays, and affect emergency response times.

Long-term rises in sea levels can convert existing upland areas along the shoreline to wetlands or create areas of inundation, potentially impacting operational areas at NSF Dahlgren. A report to the EPA, The Likelihood of Shore Protection along the Atlantic Coast of the United States, Volume 1: Mid-Atlantic, prepared in 2010 discusses the vulnerability of NSF Dahlgren and surrounding areas to sea level rise. This study evaluated areas vulnerable to sea level rise based on existing statutes, regulations, policies, and development. The report does not provide conclusions on when shoreline protection might be critical, but rather whether land would be protected once it became threatened. The report states that

> *The primary area where the 20-ft contour extends farther inland is on Mathias Point Neck in King George County. The U.S. Naval Surface Warfare Center, Dahlgren Division occupies a substantial portion of this area, including lands on both sides of Machodoc Creek. The neck just to the south of Mathias Neck, known locally as Pumpkin Neck, is also low lying, and the U.S. Navy owns the majority of the land.*

The report identifies NSF Dahlgren including Pumpkin Neck Annex as red on included maps due to the uncertainty of the impact of sea level rise on the installation, but presumes that federal properties will take proactive measures to protect shorelines within their purview.

Human activities such as groundwater withdrawals that may reduce aquifers without sufficient recharge can, over the long term, create land subsidence, or the sinking of land from aquifer compaction. Land subsidence can increase flooding, alter wetland and coastal ecosystems, and damage infrastructure. Land subsidence can exacerbate the impacts of sea-level rise – as relative sea levels rise, shorelines retreat and the magnitude and frequency of near-shore coastal flooding increases. Although land subsidence can be slow, its effects accumulate over time. Because land subsidence contributes to relative sea-level rise, it is important for regional planners to understand why, where, and how fast it is occurring, now and in the future.

To protect NSF Dahlgren and the surrounding communities near the coastlines of Virginia and Maryland, awareness and long-term planning are necessary to mitigate impacts associated with climate change.

Source: The Likelihood of Shore Protection along the Atlantic Coast of the United States, Volume 1: Mid-Atlantic, 2010

Existing Tools

Department of Defense Senior Sustainability Council

The Senior Sustainability Council was developed in 2010 as part of Executive Order (EO) 13423, and consists of military leaders that collaborate to develop strategies and policies for sustainable actions that can be implemented for military installations. This organization oversees the military departments' support and development of alternatives to address climate change adaption. The council consists of the Federal Sustainability Executive and several Senior Sustainability Officers from federal agencies. Their duties include serving as the steering committee for sustainability, as advised under EO 13423; advising the Office of Management and Budget Director and the Council on Environmental Quality (CEQ) Chair; facilitating the implementation of each agency's

sustainability plans; and promoting the progress towards the goals of the EO.

It is important for all branches of the military to have a representative on the Senior Sustainability Council, as each branch has operational bases located along coastlines and in other areas where climate change has the potential to impact operations. Advising of sustainable practices at these military installations through this council could help promote progress towards adapting to and mitigating climate change effects.

Source: http://www.dtic.mil/dtic/tr/fulltext/u2/a567081.pdf

Climate Change Adaption Task Force

Executive Order (EO) 13514 established the Climate Change Adaption Task Force (Task Force), which was charged with developing recommendations for Federal agency actions in support of a national climate change adaptation strategy. One of the recommendations of the Task Force was that Federal agencies develop and implement their own climate adaptation plans.

Based on the recommendations from the Task Force, the Interagency Climate Change Adaptation Agency Working Group (Working Group) developed implementing instructions for adaptation planning and provided guidance to the CEQ on climate change requirements and adaption implementations. The CEQ used the Working Group recommendations to provide instructions for agencies to ensure effective implementation. These implementation instructions include the following for the head of each agency, which includes the Department of Defense (DOD):

- Establish an agency on climate change adaptation policy
- Increase agency understanding of how the climate is changing
- Apply understanding of climate change to agency mission and operations
- Develop, prioritize, and implement actions
- Evaluate and learn

From the requirements found in EO 13514 and EO 13653 to develop a climate change adaptation plan, the 2014 update to the DOD Climate Change Adaptation Roadmap was developed.

Source: http://www.whitehouse.gov/sites/default/files/microsites/ceq/adaptation_final_implementing_instructions_3_3.pdf

Climate Change Adaption Roadmap

In the Climate Change Adaptation Roadmap, the DOD focuses on adaptive activities to protect nationwide installations and their operations from climate change impacts. The roadmap identifies the effects of changes in climate on installations and how to integrate different plans to manage the potential impacts through three goals. The first goal of the roadmap is to "identify and assess the effects of climate change on the department." Goal two states to integrate climate change considerations across the department and manage associated risks." The third goal continues by stating the need to "collaborate with internal and external stakeholders on climate change challenges." These goals are supported by four main lines of effort:

- **Plans and Operations** include the activities dedicated to preparing for and carrying out the full range of military operations. Also included are the operating environments in the air, on land, and at sea, at home and abroad, that shape the development of plans and execution of operations.
- **Training and Testing** are critical to maintaining a capable and ready Force in the face of a rapidly changing strategic setting. Access to land, air, and sea space that replicate the operational environment for training and testing is essential to readiness.
- **Built and Natural Infrastructure** is both necessary for successful mission preparedness and readiness. While built infrastructure serves as the staging platform for the Department's national defense and humanitarian missions, natural infrastructure also supports military combat readiness by providing realistic combat conditions and vital resources to personnel.

- **Acquisition and Supply Chain** include the full range of developing, acquiring, fielding, and sustaining equipment and services and leveraging technologies and capabilities to meet the Department's current and future needs, including requirements analysis.

In regard to policy framework, the DOD has published several Quadrennial Defense Reviews, the first in 2010 and the next in 2014. The reviews state that climate change has the potential to increase the frequency, scale and complexity of future missions while at the same time suppressing the capacity of domestic installation that support training activities. The progress of DOD strategies towards climate change mitigation is also detailed within the Strategic Sustainability Performance Plan. Although the progress of these strategies may be hard to measure, implementation of these mitigation efforts, such as incorporating changes in energy use, may help with overall adaptation goals for many coastal military installations.

Source: DOD Climate Change Adaptation Roadmap, 2014.

Assessing Impacts of Climate Change on Coastal Military Installations

The white paper for assessing impacts of climate change on coastal military installations outlines a detailed approach to addressing a new policy challenge for adapting to climate change. It discusses several technical and institutional considerations that for a foundation for developing climate change policy and guidance.

A section of the white paper's introduction details installation vulnerabilities and risks, stating that installations include extensive infrastructure that is vulnerable, especially in coastal areas. Additionally, it states that these installation and their operations and missions are particularly vulnerable to the impacts of climate change such as sea level rise.

Several technical considerations are provided in the white paper, which detail specific concerns geared at informing policy. These considerations include the following:

- Integrating climate change into planning and management decisions
- Accounting for regional variation in assessments
- Using screening level versus detailed assessments
- Selecting and applying future condition scenarios (including sea level change scenarios)
- Matching analysis timeframes and spatial scales to decision types and planning horizons
- Ensuring quality data
- Addressing uncertainty
- Enabling the ongoing use of climate science in decisions

In addition to these considerations, which are more or less portrayed in the DOD climate change roadmap, Appendix A of the white paper provides several project fact sheets for installations that are similar in coastal geography to NSF Dahlgren. These fact sheets include:

- Project RC-1700: Effects of Near-Term Sea Level Rise on Coastal Infrastructure.
- Project RC-1701: Quantifying Risks of Climate Change and Sea Level Rise to Naval Station Norfolk.
- Project RC-1702: Shoreline Evolution and Coastal Resiliency at Two Military Installations: Investigating the Potential for and Impacts of Loss of Protecting Barriers.
- Project RC-1703: A Methodology for Assessing the Impact of Sea Level Rise on Representative Military Installations in the Southwestern United States.

These fact sheets detail the impacts and findings of sea level rise assessments on coastal military installations, including for Eglin Air Force Base in Florida, Marine Corps Base Camp Lejeune in North Carolina, and Naval Station Norfolk, Virginia. Many of the findings from these fact sheets would theoretically apply to similar impacts and potential policy direction for NSF Dahlgren and other coastal military installations in the U.S.

Source: SERDP & DOD Assessing Impacts of Climate Change on Coastal Military Installations: Policy Implications, 2013.

Virginia Department of Environmental Quality Coastal Zone Program

The Virginia Department of Environmental Quality (DEQ) operates the Coastal Zone Management (CZM) Program which is taking steps to prepare for and potentially mitigate the predicted effects of climate change, particularly sea level rise on the coast. Together with the Virginia DEQ, several coastal planning district commissions are assessing and mapping potential impacts of sea-level rise and seeking to employ adaptation efforts through grant projects and funding support. These coastal planning commissions are now moving towards policy development that would establish a framework for local responses to climate change issues, including sea level rise. The program also supports climate change education and outreach efforts and the promotion of the use of living shorelines, which will help sustain wetlands as sea levels rise. As of now, there is no mention of military installation coordination or inclusion on these CZM adaptation efforts.

Source: http://www.deq.virginia.gov/Programs/CoastalZoneManagement/CZMIssuesInitiatives/ClimateChange.aspx

Findings

- Sea level rise is a major concern for Virginia and Maryland coast lines, in this case along the Potomac River.
- Climate change can threaten the operations of NSF Dahlgren since many of the testing facilities are located on or along the waterfront.
- Ongoing efforts described in the Climate Change Roadmap will allow for existing military installations to be prepared for future cases of change in weather.
- The SSC and Task Force work to complete goals of the Climate Change Adaption Roadmap and other mitigation / adaptation policy for DOD installations.
- The white paper on assessing climate change impacts on coastal military installations is a great tool for understanding specific vulnerabilities and assets of coastal installations and the threat climate change and sea level rise poses to their mission and operations. The fact sheets within the appendix are extremely helpful in addressing specific installations, and should be conducted for each coastal military installation if any update to this white paper was developed.
- One potential strategy for the implementation of policy and adaptation measures of the Virginia CZM Program could be the incorporation of DOD and state military installations into the impact mitigation efforts and planning for climate change and sea level rise.

Communication / Coordination

This discussion refers to the programs and plans that promote interagency coordination. Interagency communication serves the general welfare by promoting a more comprehensive planning process inclusive of all affected stakeholders. Interagency coordination also seeks to develop and include mutually beneficial policies for both communities and the military in local planning documents, such as comprehensive plans and regional planning efforts.

Compatibility Assessment

Issue COM-1	**No Formal Process or Designated Point of Contact for Military to Review or Provide Technical Input into Community Development Projects.** There is no formal agreement or standard process for including the Navy in the review and approval of community development projects proposed within the study area. Projects in areas that experience increased noise levels, including along the waterfront, have been approved without the Navy being informed of development proposals.

While NSF Dahlgren and local communities may engage in verbal and electronic communication on certain matters, there is no formal agreement establishing delineated points-of-contact, associated contact information, or the roles and responsibilities for each affected agency within the JLUS Study Area. Without a formal agreement, confusion and duplication of resources or to inability to reach the intended audience in a timely manner may occur.

There are several plans and programs in the area whose common goal is to preserve and protect the natural environments along the Chesapeake Bay. With a multitude of agencies operating from unique individual mission statements, sharing of resources can be a problem making solutions to compatibility issues more difficult. This common goal overlap among jurisdictions and programs can also cause training delays for NSF Dahlgren operations.

Coastal waterfront development including dredging activities is of particular concern due to the Navy's use of the Potomac River as a test range and potential unexploded ordnance in the river from historical testing activities dating back to 1918. Although some communication occurs through an informal process, the lack of a designated point of contact and standard process that allows the military to review or provide technical input on development projects has resulted in potential incompatible development in the surround areas, including:

- The Swan Point Marina development in southern Charles County, Maryland is in the process of reactivating wetland permits. The Navy has not been consulted on the overall development plans or reviewed the plans for potential impacts on PRTR operations.
- King George County has not received Navy input on proposed development projects or draft plans (e.g., the recently updated King George Comprehensive Plan) that were forwarded to NSF Dahlgren for review.

Swan Point Development

The Swan Point Development Corporation has plans to build a marina and observation piers on the Potomac River in Swan Point, southern Charles County, Maryland. The company is seeking to build a marina along the river with 143 boat slips, several observation piers, over 1,400 more new homes and a four-star conference hotel. The current Swan Point development has been experiencing noise disruptions from PRTR testing, causing distractions during range activities. The Navy is concerned that additional waterfront development proximate to the PRTR danger zones will bring more recreational boaters and further the competition for water usage, increasing security concerns during operations.

According to the Potomac River Fisheries Commission, the project has been a recent subject of conflict, due to its potential to inhibit the use of the oyster beds that are located along that coastline. While this development could pose potential incompatibility with the biological mission of the PRFC, no formal opposition to the development is currently on the table. As of fall 2014, the developers of the project are in the process of reactivating the associated wetland permits needed.

It is important to note that, if NSF Dahlgren reintroduced fixed-wing aircraft, the Swan Point development could pose potentially incompatible uses such as medium or high density residential, within the SUA or imaginary surfaces. Additional, due to the proximity of the development, which is roughly 5 miles away from NSF Dahlgren, explosive detonations and large caliber weapons firing have the potential to impact the project due to the possible creation of more sensitive noise receptors.

Source: http://articles.baltimoresun.com/2014-05-11/features/bs-md-marina-oysters-20140509_1_oyster-bar-oyster-population-marina

Westmoreland County Growth Objectives

The majority of development along shoreline areas in Westmoreland County consists of single family residences. Some residential uses are clustered around inlets and creeks, other residential uses are dispersed along lengthy continuous stretches of Potomac River shoreline, while other shoreline areas are undeveloped.

Westmoreland County growth objectives identified in the Comprehensive Plan promote development in targeted primary and secondary growth areas throughout the county. Among the growth areas in shoreline areas is

the primary growth area located adjacent to the Town of Colonial Beach and the secondary growth area of Coles Point. Additional development in these areas proximate to the PRTR can result in potential incompatibilities with NSF Dahlgren operations.

Source: Westmoreland Comprehensive Plan, 2010.

Existing Tools

Westmoreland Comprehensive Plan

Westmoreland County's Comprehensive Plan lists a total of 32 public and private waterfront access areas comprising marinas, boat launch ramps, public beaches, and fishing piers. Kinsale and Coles Point are both Secondary Growth Areas where waterfront development is encouraged. The Plan provides policies for the protection of these waters and the Chesapeake Bay and its tributaries.

Future land use plans consist of continuing growth within Primary Growth Areas, Secondary Growth Areas, Rural Areas, and Residential Transition Areas. The Plan states "property owners or the county may rezone land to an updated zoning district based on an anticipation of a future need." The comprehensive plan also states that the county's future residential density and timing for residential development will depend on the relationship to adjacent properties and their land use.

Source: Westmoreland Comprehensive Plan, 2010.

King George County Comprehensive Plan

The King George County Comprehensive Plan defines the area around NSF Dahlgren as a Primary Settlement Area (PSA). Within this area, development is encouraged to support NSF Dahlgren and its missions, although it is also encouraged to be compact and a mix of uses. One goal is intended to balance future land use development with the interests of the surrounding communities, and while the installation is mentioned, no standard communication or approval process is acknowledged.

Formal coordination of future growth plans proximate to NSF Dahlgren within King George County could potentially encourage compatible development and ultimately protect the installation and its operations against future conflict.

Source: King George County Comprehensive Plan, 2013.

Northern Neck-Chesapeake Bay Public Access Authority Act

The Northern Neck Chesapeake Bay Public Access Authority Act was established to increase the use of existing public-access sites along the bay area. The Act establishes a public access authority known as the Northern Neck Chesapeake Bay Public Access Authority (NNCBPAA). By communicating with the local residents for insight the Authority is able to determine and develop new site locations for public access. Additional goals of the Authority are to preserve the natural area of the Northern Neck. By working with local jurisdictions, the Authority is able to determine ownership of the potential public-access sites proposed by the communities, so that the land can be bought or sold based on the goals the Authority has established. Beyond recreational access to the waterfront areas, due to Westmoreland County's close proximity to NSF Dahlgren, land use decisions and future development approved in the County without military review could potentially have a greater chance to cause adverse impacts. Additionally, the decisions made regarding waterfront public access locations should be coordinate with NSF Dahlgren due to the fact that the installation uses the Potomac River for operations, and an increase in public access within the PRTR could cause safety concerns.

Source: http://law.lis.virginia.gov/authorities/northern-neck-chesapeake-bay-public-access-authority-act

Virginia Capital Improvement Program

The Virginia Capital Improvement Program (CIP), if directed by the local governing body, establishes a planning commission to prepare and revise a CIP annually. This management program outlines all the physical public improvements over a five-year period. This tool can be useful for developers, planners, and other land use management agencies to make a general assessment about a proposed project's compatibility with adjacent land uses, especially within the vicinity of NSF Dahlgren.

Source: Virginia Capital Improvement Program.

Public Affairs Office, Naval Support Activity South Potomac

The Public Affairs Office (PAO) for Naval Support Activity South Potomac (NSASP) monitors and logs noise complaints from range activities. The NSWCDD Corporate Communications Office in collaboration with the PAO monitors and logs noise and testing queries from range activities. Since NSWCDD is the source of testing, testing schedules are found on its website and via a toll free number. The PAO maintains a list of area responder organizations and civilians that have requested to be notified before testing activities when higher levels of noise may occur. The PAO does not have any formal means of communicating with local communities on development projects, although informal communication such as emails and letters are often utilized when installation personnel have interest in a development.

Source: http://www.navsea.navy.mil/nswc/dahlgren/EIS/3-Ch3.pdf

South Potomac Civilian-Military Community Relations Council

The South Potomac Civilian-Military Community Relations Council (COMREL) serves as a means to promote consistent and efficient communication between NSF Dahlgren and the surrounding communities. The Council's goal is to help achieve goals of mutual benefit and address concerns, including encroachment and noise problems. Membership includes a broad spectrum of representatives, including military personnel, elected officials and civilians. While there are meetings, presentations and other informal means of coordination, no formal communication mechanisms between the council and property developers exists, and COMREL does not have a mandate to proffer insight into operations and the impacts that NSF Dahlgren activities may have on proximate development. As an organization, COMREL does not provide position papers or attend public meetings or hearings regarding the consideration or approval of development projects proximate to NSF Dahlgren.

Source: http://www.dcmilitary.com/article/20140530/NEWS07/140539992/comrel-meets-in-colonial-beach.

Code of Virginia

Several sections of the Code of Virginia require coordination between local jurisdictions and military installations:

- Section 15.2-2211 states that "the planning commission of any locality shall consult with the installation commander of any military installation that will be affected by potential development within the locality so as to reasonably protect the military installation against any adverse effects that might be caused by the development. Planning commissions may appoint committees and may adopt rules as needed to effect such cooperation."
- Section 15.2-2294 of the Code of Virginia mandates airport safety zoning by localities.
- Section 15.2-2283 requires zoning ordinances to (ix) protect airport safety areas and to (xi) protect against encroachment upon military installations.
- 15.2-2200 declares the legislative intent of the planning and zoning enabling legislation states that the "concerns of military installations be recognized and taken into account" and that "installation commanders shall be consulted"
- 15.2-2204 establishes notice requirements for military installations for comprehensive plan amendments, rezonings, or special exceptions.

However, these requirements are not uniformly executed at the local level and there is no enforcement.

Maryland Military Installation Council

The Maryland Military Installation Council (MMIC) works to identify infrastructure and support for the development and / or expansion of Maryland's military installations. The council also studies the potential impact of development and expansion on local communities. The Council also researches how communities cope with increased development around military installations, and reviews policies in order to best support the mission of the military installations and maximize economic benefits to the region. While the council researched how jurisdictions deal with increased development, it is unclear if they also research how proximate development can adversely impact military installations in Maryland.

Source: http://msa.maryland.gov/msa/mdmanual/26excom/html/23military.html

Findings

- The Northern Neck-Chesapeake Bay Public Access Authority has established communication with local communities on potential public-access sites for new development. The Authority does not state coordination with NSF Dahlgren.
- Westmoreland County's Comprehensive Plan states property may be rezoned for future land use needs and that NSF Dahlgren should be considered when changes in zoning occur to better protect its operations and surrounding land uses of the installation.
- Westmoreland County Code does not stipulate how development review is coordinated between the county and NSF Dahlgren.
- King George County's Comprehensive Plan states that NSF Dahlgren is considered when determining future land use, but does not identify how this coordination occurs.
- King George County Code does not stipulate how development review is coordinated between the county and NSF Dahlgren.
- While these goals help to ensure military compatibility, the goals do not provide standards to gauge performance.

Issue COM-2	**Lack of Public Awareness of Impacts That Could Result From NSWCDD Test and Evaluation Operations.** New residents and business owners are not typically informed of their proximity to NSF Dahlgren or the military's use of the Potomac River as a test range. Newcomers are often caught off guard the first time they observe military activity, such as explosives safety testing.

Jurisdictions recognize the importance of the Potomac River and its role in enhancing the quality of life, as it draws new development, residents and business owners. For economic purposes, the jurisdictions within the JLUS Study Area strive to promote better access to the waterfront to benefit the communities' recreational experience.

However, the noise and other impacts of NSF Dahlgren and the nearby PRTR can alarm civilians if not educated of the range activities. Although the PRTR complex encompasses only water, several shoreline areas are affected particularly along the Lower Danger Zone (LDZ). Running north / south within the PRTR are the Missile Test, Terminal, Main , Anti –Aircraft (AA) Fuze, and Machine Gun Ranges.

Along the 51 miles of the Potomac River there are three danger zones that when active are restricted to the public. Frequency testing, explosives, and ammunition firing / launching are all activities that occur on the test range. Residents and business owners near the Town of Colonial Beach, Swan Point, or Cobb Island may experience the greatest noise impact.

To protect the community and reduce concerns among the residents, the installation attempts to educate the public of the operations and the measure of range management that goes into the testing activity. Although NSF Dahlgren maintains a hotline for residents to call in to inquire about military operations and/or impacts, many residents and business owners are unaware of their proximity to NSF Dahlgren or the availability of the hotline. The JLUS discovery process revealed that area residents who are properly informed with an understanding of these operations and impacts know who to contact at NSF Dahlgren if an issue arises, while most don't find a need to call as a result of their understanding. Those who reported that they do not know who to contact were also less knowledgeable of military operations and the associated impacts, such as noise levels associated with testing activities.

The lack of understanding of range activities and associated impacts can increase complaints to the NSF Dahlgren Public Affairs Office. Additionally, if real estate disclosures do not specify all the range impacts – noise and potential hazard risks, then this number of complaints can increase, which could potentially threaten the operations and mission at NSF Dahlgren.

Existing Tools

Public Affairs Office, Naval Support Activity South Potomac

The Public Affairs Office (PAO) for NSASP monitors and records noise complaints from range activities. Schedules of NSWCDD's tests can be found on the NSWCDD website and via a toll-free number. The PAO also retains a list of all civilians that have requested notification prior to activities with higher levels of noise. Their information is easily accessible through the internet.

Source: http://www.navsea.navy.mil/nswc/dahlgren/EIS/3-Ch3.pdf

Test Range Operations Brochure

The Test Range Operations Brochure offers information about typical operations and their impacts, installation contact information, and provides a website link for more information. It also includes information regarding noise levels and safe boating regulations within the PRTR.

The brochure states that to minimize the impact of noise, NSWCDD uses a Sound Intensity Prediction System which monitors noise conditions. If the noise is predicted to be too loud in certain locales, testing will be delayed. While civilians may not know of this system and noise predictions, it does sometimes alleviate potential noise levels and complaints.

Regulations for Safe Boating in the Middle Danger Area of the Potomac River were established to ensure no watercraft enters the firing range during operations. Range boats are placed near the testing area, and when these boats are flying a red flag; the danger area must be cleared. While boaters may not know of the purpose or identification of these range boats, there are also warning and danger signs posted in the PRTR.

Source: NAVSEA Test Range Operations Brochure, 2011.

Virginia Real Estate Disclosure Laws

The Virginia Code ensures coordination between local governments and military installations within areas covered by their comprehensive plans and/or land use regulations. While only specifically authorized and required for use in conjunction with defined noise and accident potential areas around military air installations, the statutory framework currently exists in Commonwealth law for the implementation of real estate disclosures for military operational impacts.

Source:https://leg1.state.va.us/cgibin/legp504.exe?000+cod+55-519.1

Virginia Residential Property Disclosure Act

The Virginia Residential Property Disclosure Act, Title 55, Chapter 27 of the Code of Virginia, states that the owner of any property near a military installation shall disclose noise zone and accident potential information to the purchaser. The Disclosure Act further protects the communities surrounding the installation within Virginia jurisdiction. Pursuant to this act, any purchaser of residential property within proximity of NSF Dahlgren should therefore be aware of the installation and its potential impacts such as noise and safety concerns.

Source: https://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+55-519.1

Maryland Real Property Article of the Annotated Code

The Maryland Real Property Article of the Annotated Code of Maryland, Section 14.117(k), provides detail that states a contract for the sale of a residential real property shall contain a statement regarding high noise levels, if the property is subject to these impacts from proximity to a military installation. Pursuant to this article, any purchaser of residential property within proximity of NSF Dahlgren should therefore be aware of the installation and its potential impacts such as noise and safety concerns.

Source: http://www.lexisnexis.com/hottopics/mdcode/

Real Estate Disclosure (Southern Maryland Contract of Sale)

The Southern Maryland Real Estate Disclosure forms state that prior to the sale of any property located near a military aircraft operation center within Calvert County, Charles County, Prince George's Count or St. Mary's County, the buyer should be made aware of the installation and its potential for high noise levels and accident possibilities.

The statement ensures disclosure of noise, and potential impacts from military aircraft, but does not define the proximity of military installations where it is required.

Source: MAR standard Contract of Sale; SMAR 2008 Addendum.

Source: http://law.lis.virginia.gov/authorities/northern-neck-chesapeake-bay-public-access-authority-act

South Potomac Civilian-Military Community Relations Council

The South Potomac Civilian-Military Community Relations Council (COMREL) serves as a means to promote consistent and efficient communication between NSF Dahlgren and the surrounding communities. The Council's goal is to help achieve goals of mutual benefit and address concerns, including encroachment and noise problems. Membership includes a broad spectrum of representatives, including military personnel, elected officials and civilians. While there are meetings, presentations and other informal means of coordination, no formal communication between the council and local residents exists, and COMREL does not have a publicly accessible website for residents to visit and gain insight into operations and impacts associated with NSF Dahlgren activities.

Source: http://www.dcmilitary.com/article/20140530/NEWS07/140539992/comrel-meets-in-colonial-beach.

Findings

- In the past, base officials have held community briefings to address concerns and raise awareness of the installations operations and range activities to gain community support
- The Test Range Operations brochure educates local residents on the operations that occur at NSF Dahlgren.
- The Northern Neck-Chesapeake Bay Public Access Authority does state coordination with Westmoreland and its residents but does not strive to develop an educational program for the community. By educating the public and tourists, the potential impacts may be mitigated and further support from the community can be established.
- The Virginia Code is a useful tool to help minimize incompatible future development that is within proximity of a military installation.
- The Virginia Real Estate Disclosures Codes establish coordination with the installation and the residents. It also ensures disclosure of proximity to a military installation. However; it only discloses noise from aircrafts if within an APZ or CZ zone. This could cause potential complaints to new residents.
- The Virginia Real Estate Disclosure Act addresses both noise and accidental zones for buyers within proximity to a military installation.
- The Southern Maryland Real Estate Disclosure does ensure full disclosure of military impacts from military aircraft operation centers for new residents and business owners.
- Maryland Real Estate disclosures are optional for sellers, and the buyer is solely responsible for contacting the installation for full disclosure.
- Town Hall meetings, Range picnics, and other social events can help NSF Dahlgren communicate with new residents and help build community support.

Issue COM-3	**Lack of Awareness Amongst Tourists about Dahlgren's Presence and Operations in the Area.** Visitors and tourists to the area are often unaware of the NSWCDD mission or use of the Potomac River as a test range. Tourists have been escorted off of the water when range activities are planned. Tourists have also complained about noise resulting from range activity without knowing the source or that they were visiting an area with heavy military use. Striking a balance between providing enough information about the NSWCDD mission and operations to tourist and appealing to those seeking a quiet waterfront destination has become a challenge to communities in the area.

Tourism is a vital part of the JLUS Study Area's economic development. The Potomac River waterfront is a popular tourism destination for visitors because of its historical significance and varying recreational activities. There are about 30 marinas, docks, and boat ramps along the Potomac River, providing tourists with access to the PRTR for fishing and recreation opportunities.

Due to the extent of NSWCDD's weapons testing along the Potomac River within the PRTR, visitors and tourists who are unfamiliar with the installation have the potential to be alarmed by the activity. Noise occurring from range testing may cause a disturbance to the tourists and visitors causing an increase in complaints to and about NSF Dahlgren.

Existing Tools

Northern Neck Tourism Commission

By capitalizing historical and recreational resources the Northern Neck Tourism Commission is able to promote new opportunities to increase the visitor and tourism experience. The commission works with local agencies, county and town governments, and organizations to attract new tourism. The purpose of the commission states it is meant "to serve as a catalyst for communication and interaction among our nonprofit organizations, government, businesses and individuals".

Additionally, the commission has organized an online resource, the Northern Neck Connection, to provide the community and incoming tourists on information and activities. This tool is very resourceful for visitors and residents to use, but no apparent communication of NSF Dahlgren's operations or range activities are incorporated on the webpage.

Source: Northern Neck Tourism Plan, 2011.

Northern Neck Tourism Plan

Established by the Northern Neck Tourism Commission, the plan was developed to provide the commission with objectives that enhance the tourist economy in areas such as King George County, Westmoreland County, and the Town of Colonial Beach.

The plan is used as a guidance tool for the Commission when determining new tourism related decisions, although there is no mention of NSF Dahlgren operations and their potential impacts on surrounding areas which support tourism and transient populations.

Source: Northern Neck Tourism Plan, 2011.

Colonial Beach Foundation

Also known as the Vision Committee, the foundation establishes goals to improve and protect the quality of life for the community. The Committee works with local high schools, agencies, and foundations to promote their visions to achieve strong community support. The organization communicates with the residents of the JLUS Study Area and has accomplished goals in either establishing or preventing new development or policies along the waterfront areas.

Source: http://www.colonialbeachfoundation.org/

Potomac River Heritage Tourism Alliance

This independent organization seeks to protect the Potomac River while encouraging tourism in the area. Consisting of 50 heritage and recreational organizations, the Alliance studies the recreational sites located along the Potomac River so that further measures to increase usage and protection to sensitive areas can be established. While this is a good tool for enhancing tourism and usage of historical or heritage oriented properties, the Alliance does not consider the proximity of NSF Dahlgren, or its potential impacts on these recreational sites including noise impacts on increasing populations visiting these recreational sites.

Source: http://www.potomacrivertourism.com/

Test Range Operations Brochure

The brochure offers information about NSWCDD's operations and missions and is available online. It provides tourists and visitors a phone number, and website to educate and inform of the potential disturbances to the area, although it is possible that with no knowledge of the installation's whereabouts, there may be no knowledge of the brochure.

The brochure also educates potential visitors and tourists using the MDZ of protocols for safe boating within the PRTR.

Source: NAVSEA Test Range Operations Brochure, 2011.

South Potomac Civilian-Military Community Relations Council

The South Potomac Civilian-Military Community Relations Council (COMREL) serves as a means to promote consistent and efficient communication between NSF Dahlgren and the surrounding communities. The Council's goal is to help achieve goals of mutual benefit and address concerns, including encroachment and noise problems. Membership includes a broad spectrum of representatives, including military personnel, elected officials and civilians.

While there are meetings, presentations and other informal means of coordination, no formal communication between the council and tourists / visitors exists, and COMREL does not have a publicly accessible website for residents or transient populations to visit.

Source: http://www.dcmilitary.com/article/20140530/NEWS07/140539992/comrel-meets-in-colonial-beach.

Findings

- The Test Range Operations Brochure is a good source for information regarding waterfront range activities though it is only available online at the NSWCDD website and distributed at public meetings.
- While the Northern Neck Tourism Commission provides the community with information and online services on recreational activities near the Potomac River Online for visitors and local residents, NSF Dahlgren operations are not included.
- The Northern Neck Tourism Plan establishes guidelines for the Commission to follow in order to enhance tourism for the surrounding areas, but there is no mention of NSF Dahlgren activities or impacts.
- The Colonial Beach Foundation enhances and protects the quality of the community. There is no direct relation with NSF Dahlgren and its missions.
- The Heritage Tourism Alliance does seek measures of protection and promotion of recreational activities but does not state coordination with visitors on NSF Dahlgren's activities.

Issue COM-4	**No Formalized Agreement Regarding Communication Coordination Between Navy and Communities.** There is no formal community engagement or communication plan with communities. The NSF Dahlgren Community Planning and Liaison Officer monitors activity and development in jurisdictions to discover potential changes in the area. Relationships between community leaders and NSF Dahlgren are further constrained by changes to and reorganization of military personnel.

Due to the large geographical area and number of stakeholders affected by NSF Dahlgren and associated range operations, communication to enhance awareness as well as address community concerns is a constant and evolving challenge for both NSF Dahlgren and its community partners. There is currently limited formal coordination or communication between the various regional entities to address overlapping mission training areas or mutual interests and concerns.

NSF Dahlgren initiates communication with the general public and other federal and state entities through various outlets including its designated Community Planning and Liaison Office (CPLO).

The level of interaction and communication between NSF Dahlgren and local jurisdictions varies widely based on proximity to the installation. Communication with jurisdictions in the JLUS Study Area occurs through informal means such as personal relationships and phone calls, which are subject to disruption or termination as key points of contact change.

Existing Tools

South Potomac Civilian-Military Community Relations Council (COMREL)

Founded in October 2008, the South Potomac Civilian-Military Community Relations Council (COMREL) serves as a means to promote consistent and efficient communication between NSF Dahlgren and the surrounding communities. The council's goal is to help achieve goals of mutual benefit and address concerns, including encroachment and noise problems. Membership includes a broad spectrum of representatives, including military personnel, elected officials and civilians. While there are meetings, presentation and other informal means of coordination present, no formal agreements or understandings exist between COMREL and local communities proximate to NSF Dahlgren.

Source: http://www.dcmilitary.com/article/20140530/NEWS07/140539992/comrel-meets-in-colonial-beach.

Fredericksburg Regional Chamber of Commerce Military Affairs Council

The mission of the Fredericksburg Regional Chamber of Commerce Military Affairs Council is to support the interests of the communities that involve the military and its defense industry. The council also serves as a point of contact between the installations and the communities. The council can be used as a tool for local jurisdictions and NSF Dahlgren to utilize for future communication and coordination, although no formal commitments or agreements exists between the council and NSF Dahlgren.

Source: http://www.fredericksburgchamber.org/Military-Affairs-Council-Home.

Maryland Military Installation Council

The Maryland Military Installation Council (MMIC) is a great tool for jurisdictions and NSF Dahlgren to utilize. The MMIC identifies development and community support that is needed for installation expansion. The MMIC also determines the potential impacts that the development causes on local communities. Additionally, the MMIC evaluates how other jurisdictions cope with increased development near military installations, although there is no formal agreements or commitments regarding communication with military installations or their adjacent communities.

Source: Economic Development Article §11-207, 2011.

King George County Comprehensive Plan

King George County states their support for the Navy activities at NSF Dahlgren. It also states their continued consideration of the installations missions in land use decisions. However, the plan does not

state any form of communication with NSF Dahlgren or policies to ensure this coordination when establishing strategies and goals.

Source: King George County Comprehensive Plan, 2013.

Findings

- The COMREL partnership enables military and community leaders to stay in consistent contact when discussing NSF Dahlgren's range activities and surrounding community planning.
- The Fredericksburg Regional Chamber of Commerce Council is a supporter of NSF Dahlgren despite its proximity to the installation.
- The MMIC can help minimize incompatible development near NSF Dahlgren and should be considered when new development is proposed.
- The MMIC does not state which jurisdictions they have partnered with nor do they provide direction on how the communities are contacted. King George County's Comprehensive Plan only states support of the Navy's activities but does not incorporate communication with NSF Dahlgren in the plan.
- Although the Public Affairs Office at NSF Dahlgren is responsible for community relations, no Community Planning and Liaison Office (CPLO) for NSF Dahlgren exists.

Energy Development

Development of energy sources, including alternative energy sources (such as solar, wind, geothermal, or biofuels) could pose compatibility issues related to glare (solar energy), or vertical obstruction (wind generation), or water quality / quantity.

The moving blades of a wind turbine create a Doppler effect that can interfere with radio transmissions between air traffic controllers and aircraft and other types of communications, such as satellites. Recent studies indicate that large numbers of wind turbines located between five and eight miles from a radar system can have a negative impact on the system and interfere with readings. The impacts on radar are increased with the height, number, and clustering of turbines. The greatest impact is caused by their location proximate to the radar system. Although research is still being conducted, it is not fully known how tall, large, or how many wind turbines must be present to compromise radar operations.

Solar facilities can cause substantial amounts of glare depending on their type, location, angle, and direction, resulting in a reduction of a pilot's view, even at high altitudes.

Compatibility Assessment

Issue ED-1	**Potential Wind Farm Development in Region Could Interfere with Military Devices / Operations.** Areas proximate to Dahlgren have been identified by wind farm developers as an area of interest for potential alternative energy projects. The siting of wind farms within 25 miles of Dahlgren and the Potomac River Test Range would result in impacts to Navy systems and operations, particularly communication infrastructure and frequency interference.

Generally, the installation of personal wind towers (which are typically lower than 50 feet in height) on residential land is not a concern that would impact flight operations, provided they are not located within the runway safety zones or the Approach-Departure Clearance Surfaces. Whether a personal wind tower constitutes a hazard would be determined on a case-by-case basis in accordance with local zoning ordinances and regulations.

Future commercial wind energy presents a possible threat to NSF Dahlgren, despite its clean energy benefits. The presence of wind farms present challenges to air and weapons testing such as:

- Vertical Obstruction
- Radio frequency (RF) interference or clutter
- Screening

Radio frequency (RF) clutter sources, such as wind turbines, have the potential to corrupt the accuracy of radar signals critical to range testing produced by the rotating turbine blades inducing undesired Doppler shift on the radar signal. Wind farms heighten this effect due to the increase in density of wind turbines.

The two main impacts of large wind farms are screening, or blocking out portions of the "field of view" so that it cannot see aircraft that fly behind the "screen"; and causing false readings on the radar that make it appear there are aircraft flying in the area that are not there. All types of wind development have the potential to affect radar operations at NSF Dahlgren because of frequency interference. Consequently, this impact depends on the height of the wind turbines, the distance from NSF Dahlgren and its operational areas, and the density of the turbines.

Both Virginia and Maryland are actively pursuing the development of land-based and shoreline wind energy. Based on recent studies, there are particular locations with ideal prospects for economically viable wind power, primarily within coastal and nearby off-shore areas. The DOD and Federal Aviation Administration (FAA) have coordination-oriented policies in place to review the site selection with local jurisdictions.

In addition, both states consider land-based wind turbine towers as a potential source of income for farmers, to supplement and subsidize their income. While economic sustainability of farmland is a major policy objective in both states, towers located in low level flight paths, proximate to military installations or nearby regional airports could create vertical obstruction safety hazards and impair military operations due to radar interference.

Existing Tools

Department of Defense Energy Siting Clearinghouse

The Navy strives to balance operations and training requirements with community development in the vicinity of Navy land, sea, and air assets. These activities may include the development of renewable energy projects, transmission lines, residential/commercial structures, and other forms of development or alterations of land, air, and sea space.

To avoid potential mission impacts, the Navy collaborates with federal regulatory agencies, state and local governments, and the business community to communicate concerns early in the planning and development process and achieve compatible solutions. As described in chapter 4, the main responsibility of the DOD Energy Siting Clearinghouse is to comprehensively review and evaluate proposed energy projects and their possible effects on DOD operations. All proposed projects within military training routes or airspace must undergo the formal review process.

Source: http://www.acq.osd.mil/dodsc/

Virginia Coastal Energy Research Consortium

The Virginia Coastal Energy Research Consortium (VCERC) was created by the state legislature in 2007 and has been involved in developing coastal energy technologies and reports to assist the state in meeting the targets of the Virginia State Energy Plan. The VCERC provides research and development required for the commercialization and implementation of renewable energy resources available in Virginia, including wind energy.

Some resources that are available through the VCERC include a fact sheet on wind energy, an educational PowerPoint presentation on offshore wind energy in the state of Virginia, as well as a report of compiled Virginia Offshore Wind Studies. This report, while not relevant to onshore wind energy facilities, is still important for assessing the location, use and impacts associated with wind energy in the state. The report identifies preliminary mapping of offshore areas, evaluates the risks and opportunities, and provides a list of recommendations for offshore wind development and future research. It can also be used as a model for future reports that may detail onshore wind studies in Virginia, which would be relevant to NSF Dahlgren and its mission activities.

Source: http://www.vcerc.org/index.htm

2010 Virginia Energy Plan

The Virginia Energy Plan was published by the state Department of Mines, Minerals and Energy in 2010 and assesses the state's energy resources such as electricity, natural gas, renewables, and petroleum. The plan provides an overarching set of goals and recommendations, while attempting to expand public education about the production and consumption of energy in the state.

Section 6 of the Virginia Energy Plan details renewable energy, and further identifies onshore and offshore wind energy as two of the greatest contributors to Virginia renewables. The plan mentions that commercial wind power generation is found along the coast and in other areas of the state, as well as offshore in federal waters. The section identifies several locations of proposed facilities (such as on Wallops Island and on Port Isabel) and relevant agencies, such as the Virginia Wind Energy Collaborative (VWEC), who provide support to assess the proper locations and uses of wind power generation. The VWEC also developed the Wind Landscape Classification System to help identify the suitability of sites for wind projects. One of the goals in the plan refers to offshore wind energy and the military.

> *Offshore wind projects will need to be developed in areas not in conflict with Navy and other Department of Defense, shipping, fishery, and other uses of the offshore areas.*

This is important due to the fact that there are several DOD facilities located within coastal Virginia (and Maryland) areas, including NSF Dahlgren.

Source: Virginia Energy Plan, 2010.

Maryland Offshore Wind Energy Act of 2013

Also known as House Bill 226, the Maryland Offshore Wind Energy Act of 2013 establishes an application and review process for proposed offshore win projects by the Public Service Commission (PSC). Since the act describes a qualified offshore wind project to be between 10 and 30 miles off the coast in the outer continental shelf of the Atlantic Ocean, these projects will not impact vertical obstructions or radar interference and will not likely have an effect on NSF Dahlgren or its operations.

Source: House Bill 226; Maryland Offshore Wind Energy Act of 2013.

Maryland Offshore Wind Development Report

The Maryland Offshore Wind Development report, published in 2010, is a comprehensive assessment of wind energy facilities, transmission, use and regulatory context in the state of Maryland. The report analyzes relevant policy for offshore wind in Maryland, such as the Offshore Wind Energy Act and state renewable portfolio standards. Additionally, the report identifies potential interconnection points for offshore wind, and assesses them and their importance and impacts on the onshore transmission grid. Listings of (and geographically representing) transmission lines and substations on the Delmarva peninsula help identify locations of possible conflict, of which most are located in Delaware and on the eastern side of the Delmarva peninsula.

Within the report, there is a chapter devoted to offshore wind turbines and their interaction with radar functionality. This section details radar-wind turbine development interactions and different interference variables, most of which are measured Doppler Effect caused by wind turbines. This is important due the fact that NASA Wallops Flight Facility (WFF) as well as Naval Air Station Patuxent River (NAS PAX), Naval Air Station Oceana and Dover Air Force Base in Delaware all have radar facilities in the area, and mid-Atlantic operations from these facilities can create the potential for conflict and interference. While the report identified the likelihood for conflict in the Wallops Flight Facility Launch Hazard Area and the Fleet Area Control and Surveillance Facility, Virginia Capes Operating Area, there was no mention of potential conflict to coastal areas of Virginia.

Source: Maryland Offshore Wind Development Report, 2010.

Model Ordinance for Community Scale Wind Energy Projects, Virginia

This model ordinance, developed in 2013 by the Department of Environmental Quality's (DEQ) Local Government Outreach Group (LOG), aims to provide a template for the siting, development, and

decommissioning of community-scale wind energy projects in local jurisdictions. Local municipalities and counties may use the model as a template when creating their own Wind Energy Project ordinances, to assist in the assessment and evaluation of new wind energy projects and their impacts on public health, safety, and welfare of citizens.

This model ordinance is important for several reasons, including the fact that projects are popping up in many places along the Delmarva Peninsula; including a proposed 157 turbine project known as Callao Wind, with a combined height of 558 feet in Westmoreland and Northumberland counties. The closest turbine would be approximately 23 miles from NSF Dahlgren and adjacent to the PRTR. Another reason this model ordinance is important is that several communities in Maryland and Virginia have already started developing wind ordinances, one of which is for St. Mary's County in Maryland.

St. Mary's Zoning Ordinance: Small Wind Energy Systems

Chapter 51, subsection 95 of the St. Mary's County Comprehensive Zoning Ordinance relates to Small Wind Energy Systems and their regulations in the county. The purpose of the regulation is to allow these systems to be constructed and installed for on-site consumption. A permit must be obtained to construct one of these systems, the location must be identified and compliance with the St. Mary's County Building Code is mandatory. The system, no matter the location, must also comply with FAA regulations, the National Electric Code, and noise standards per zoning district. Additionally, this ordinance limits the height of these structures to 85 feet, or 150 feet if located on a parcel larger than an acre. There are additional criteria that apply if the system is located within critical area overlay zones.

Source: St. Mary's County Comprehensive Zoning Ordinance, 2013.

Findings

- There are sufficient levels of federal and state programs and plans for the assessment and review of wind energy projects, yet many of them do not take into account all of the impacting variables.
- The VCERC (and other groups) have studied offshore wind energy in depth, yet not many have analyzed onshore wind energy facilities and impacts to communities, infrastructure, etc.
- The Virginia Energy Plan has initial military compatibility efforts, stating that offshore wind projects must comply with Navy and DOD operations. In retrospect, it does not mention onshore wind project compliance with Navy and DOD operations.
- There is no state level onshore wind energy legislation for Maryland and Virginia, which is important due to the high concentration of military installations in the two states' coastal areas.
- The model ordinance for community scale wind energy projects is only a year old, but is a good template for jurisdictional compatibility with alternative energy developments in or around communities. Ordinances (or compatibility zones) could also be developed for military installations using this template / concept.
- St. Mary's County seems to be the only local jurisdiction with any kind of a Wind Energy Ordinance, and it only applies to small scale (presumable residential) developments. No ordinance exists at the jurisdictional level (city or county) that applies to large scale (onshore or offshore) wind energy developments.
- Most of the existing tools assess and analyze impacts of siting and use of wind energy projects in regards to height limits. Many of the tools do not take into account communication infrastructure, screening or possible frequency (radar) interference, with the exception of the Maryland Offshore Wind Energy Development Report.
- Large projects including the Callao Wind project in Westmoreland and Northumberland counties pose possible threats to military compatibility to NSF Dahlgren.
- Wind energy impacts associated with NSF Dahlgren will be different from impacts associated with NAS PAX and other DOD facilities, due to the fact that NSF Dahlgren accommodates minimal flight activity, and has different types of operations such as testing electromagnetic energy systems and heavy ship operations in the PRTR.

Frequency Spectrum Interference

Frequency spectrum is the entire range of electromagnetic frequencies used for communications and other transmissions, which includes communication channels for radio, cellular phones, and television. In the performance of typical operations, the military relies on a range of frequencies for communications and support systems. Similarly, public and private users rely on a range of frequencies in the use of cellular telephones and other wireless devices on a daily basis.

The military's use of frequency spectrum allows for safe operations and the effective delivery of weapons on target without interference. The military's frequency spectrum needs for testing, evaluation, and training is constantly increasing, while the spectrum available for DOD use is decreasing. Frequency interference is related to other transmission sources and interference can result from a number of factors:

- Using a new transmission frequency that is near an existing frequency.
- Reducing the distance between two antennas transmitting on a similar frequency.
- Increasing the power of a similar transmission signal.
- Using poorly adjusted transmission devices that transmit outside their assigned frequency or produce an electromagnetic signal that interferes with a signal transmission.
- Existing electronic sources and uses created by portable systems affecting entire communities utilizing Wi-Fi broadband systems and industrial sources that produce electronic noise by-product.

The Navy relies on a range of frequencies for communications and support systems to successfully complete operational activities at NSF Dahlgren.

Compatibility Assessment

Issue FSI-1	**Potential Frequency Interference Could Occur from Construction Activities Associated with Nice Memorial Bridge Improvement Project.** Machinery and equipment needed for the construction of the new Harry Nice Bridge requires the use of systems that could result in frequency interference. Additional cell phone and Wi-Fi device usage would likely increase the potential for frequency interference to occur.

Development surrounding NSF Dahlgren has the potential to inhibit the military's uninterrupted use of the frequency spectrum. An upsurge in testing and evaluation at the installation is increasing its need for available frequency spectrum; however, surrounding development is creating potential conflict with this need. Machinery and equipment used in nearby construction requires the use of systems that could result in frequency impedance or interference.

One such project is the Harry Nice Bridge, which requires frequencies similar to those used at NSF Dahlgren. The Nice Bridge Improvement Project Planning Study was initiated in 2006. The study evaluated alternative options for improvements to the bridge for capacity and safety, including the construction of a new bridge. The alternative selected was the construction of a new four-lane bridge parallel to the north of the existing two-lane bridge. After the final environmental study requirements were completed and approved in 2012, the preliminary engineering phase began in 2013.

The Maryland Department of Transportation is in the planning / engineering design and right-of-way acquisition phases of the new bridge development and construction has not yet started. When the construction phase begins, there will be many types of construction equipment that may be using various frequencies for communication. Potential impacts from construction will be temporary and resolved once the construction is complete.

Civilian use of available frequency is an additional concern to operations at NSF Dahlgren. Cell phone usage or Wi-Fi devices can interfere with frequencies needed by NSF Dahlgren Research Development Test and Evaluation (RDT&E) activities and reduce the availability of the spectrum for DOD use. The new Harry Nice Bridge will double the capacity of vehicles traveling across the bridge, which will increase the number of cell phones and similar devices traversing the region. It is not likely that this increase in devices will have a major impact on operations at NSF Dahlgren, but it should be an awareness issue monitored in the future.

As the demand for wireless application grows, the complexity of the management and regulation of radio frequency develops. Therefore it is important that the military use of RF energy at NSF Dahlgren remains safe and effective in the presence of civilian tools such as cell phones and wireless broadband.

Issue FSI-2	**Growing Use of Part 15 Devices Can Potentially Interfere with Military Equipment.** The use of Part 15 devices (garage door openers, remote controls for electronic equipment, baby monitors, cordless telephones, laptop computers, wireless computer mice, wireless modems, etc.) continues to increase. Civilian use of Part 15 devices can interfere with equipment used at NSF Dahlgren and vice versa.

In June 2012, the Navy released a draft Environmental Impact Statement (EIS) for a proposed expansion of RDT&E activity at NSF Dahlgren. One of the outcomes would be an increase in the use of electromagnetic (EM) energy in the installation operating areas. This would potentially increase NSF Dahlgren's use of radio frequency in the region. Expansion notwithstanding, NSF Dahlgren relies heavily on the use of EM energy and radio frequency (RF) for its current operations and encroachment onto the Navy's use of frequency could impact its ability to carry out its mission. The primary use of EM at NSF Dahlgren is in the radio frequency range, which has more potential for interference with civilian uses. The EIS does not identify any specific impacts related to frequency interference between the military and civilian communities.

Development surrounding NSF Dahlgren has the potential to inhibit the military's uninterrupted use of the frequency spectrum. An upsurge in testing, evaluation, and training at the installation would increase the need for available frequency spectrum.

The two federal agencies that authorize the use of the electromagnetic spectrum are the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA). According to the NTIA Office of Spectrum Management:

> *Almost every agency of the federal government uses the spectrum in performing mandated missions. The DOD uses the spectrum extensively for tactical uses and non-tactical uses. In the United States tactical uses are generally limited to a number of specific testing sites and training facilities, but DOD's non-tactical applications are extensive and include aircraft command and control, mobile communication in and around military bases, and air fields and long distance communications using satellites.*

Frequency interference can also be related to other transmission sources. Interference can result from a number of different factors, including:

- using a new transmission frequency that is near an existing frequency,
- reducing the distance between two antennas transmitting on a similar frequency,
- increasing the power of a similar transmission signal,
- using poorly adjusted transmission devices that transmit outside their assigned frequency or produce an electromagnetic signal that interferes with a signal transmission, and
- existing electronic sources and uses created by portable systems affecting entire communities utilizing Wi-Fi broadband systems and industrial sources that produce electronic noise by-product.

Man-made sources of RF energy are generally intended to make use of the EM environment for communications, radar, lighting, etc. NSF Dahlgren has indicated that EM energy is a major focus at the installation used in testing done both on land and on water. Not only are EM waves essential in the technology of US Navy weapons systems on the PRTR, they play an essential role in the advanced munitions firing and detection conducted at Mainside and the Explosive Experimental Area (EEA).

Since RF is a valuable resource, its use is regulated by the government; however, not all equipment that uses RF energy is required to have a license or assignment. Part 15 is the section of the FCC rules that regulates unlicensed radio frequency devices. Electronics that use RF to operate are referred to as "Part 15 devices." Because of their limited, ultra-low power outputs, they are conditionally permitted to operate in almost all RF bands. The frequencies that are used by Part 15 devices are the same as the frequencies used by many military devices and activities, fire stations, hospitals, and police forces. According to the FCC, the DOD is not obligated to identify or mitigate potential interference with Part 15 devices. However, they also cannot monitor or regulate the locations of civilian uses of Part 15 devices.

Civilian use of Part 15 devices has the potential to interfere with the electromagnetic systems and radio operations at NSF Dahlgren. Similarly, electronic equipment on the installation can interfere with devices operated by private individuals nearby. Baby monitors, cordless telephones, laptop computers, wireless computer mice, remote keys, wireless headsets, garage door openers, low-powered walkie-talkies, and wireless modems are just a few examples of these portable, wireless electronic devices that can cause challenges or potential conflict with testing and operations at the base. NSF Dahlgren's large operational area both on- and offshore and large number of spectrum users increases the probability of interference due to proximate Part 15 devices.

The increasing regional use of Part 15 devices using frequency ranges that overlap the military frequency bands could also degrade the installation's radar performance.

Although interference and malfunction of Part 15 devices used by the consumer may be disruptive and a public nuisance, by definition, users of Part 15 devices must accept any interference that may occur from the authorized users of radio frequencies such as by the military or other government entities. Mitigation measures are available to the consumer such as installation of filters between wireless routers or the use of different channels for certain devices. Manufacturers of garage door openers have been actively engaged with working with the DOD to develop technologies that reduce or avoid the potential for garage door malfunctions and may be able to provide a retrofit to allow operation on a frequency that is not used by the local military in certain circumstances and locations proximate to military installations.

Existing Tools

Federal Communications Commission

The FCC is the agency responsible for regulating non-governmental interstate and international (which originate or terminate within the US) radio, television, wire, satellite, and cable communications within all 50 states, Washington D.C. and all US territories. It is the entity that licenses non-Federal use of the frequency spectrum through a public process.

Federal Communication Commission Public Notice DA 05-424

According to FCC Public Notice DA 05-424, dated Feb. 15, 2005, garage door opener manufacturers offered to assist consumers in the resolution of frequency interference to devices including making available for consumer purchase a replacement transmitter and receiver to operate on a different frequency than that used by government or military services and mobile radio systems. This was in response to communication and discussions between garage door manufacturers and the DOD to help reduce the impacts of frequency issues between the military and civilian uses.

Consumers who experience problems with garage door openers should contact the manufacturer or local repair shops for assistance or call the FCC Call Center at 1-888-225-5322.

National Telecommunications and Information Administration, Office of Spectrum Management

The Office of Spectrum Management (OSM) is a branch of the NTIA that is responsible for managing how the Federal government uses the radio frequency spectrum. Some of the tasks of the OSM are to assist in managing the use of the radio frequency spectrum and include assigning frequencies to government agencies, maintaining spectrum use databases, planning peacetime and wartime use of the spectrum, and participating in Federal government communications regarding emergency readiness. Approximately 70 Federal agencies and departments use the radio frequency spectrum for communications, broadcasting, navigation and other purposes that are crucial to their continued operations. The NTIA maintains a Government Master File of the more than 40 specific radio services and frequency assignments that these agencies and departments use.

Part 15 Rules

The rules and technical specifications that apply to non-federal use of unlicensed devices are in Title 47 of the Code of Federal Regulations Part 15 (47 CFR 15). There are many parts to Title 47, each regulating a different type of radio operation. For example, Part 11 regulates the Emergency Alert System, Part 59 discusses infrastructure sharing, and Part 97 covers the Amateur Radio Service. Part 15 regulates radio frequency devices and contains language specifically regulating the operation of unlicensed devices.

Federal Aviation Administration Spectrum Engineering Services Office

The Spectrum Engineering Services Office secures, manages, and protects all civil aviation radio frequency spectrum resources. Among other things, this Office is responsible for coordinating and negotiating with other government agencies, industries, and international partners to obtain appropriate spectrum resources for aviation usage and maintaining aviation spectrum resources free from interference from other services.

Spectrum management is conducted by assigning and engineering radio frequencies for the NAS systems, maintaining the aviation spectrum use database, analyzing new FAA systems requirements and certifying that spectrum resources will be providing the necessary technical engineering expertise. This process performs specific spectrum resources available assessments and tests new systems and electronics for compatibility with DOD equipment.

Federal Communication Commission's Communication Security, Reliability, and Interoperability Council

The FCC maintains an active working group to address communications system reliability through its Communication Security, Reliability, and Interoperability Council (CSRIC). The CSRIC's mission is to provide recommendations to the FCC that attempt to "ensure…optimal security and reliability of communications systems, including telecommunications, media, and public safety. Although this program is not specific to NAS PAX or maintain a specific program with NAS PAX, it should be considered an important tool in the management of communications used for emergency response situations.

Federal Strategic Spectrum Plan (2008)

The 2008 Federal Strategic Spectrum Plan is a presidential initiative for U.S. spectrum policy in the 21st Century. The Plan's goals are to foster economic growth, ensure national and homeland security, maintain U.S. global leadership in communications technology and services, and satisfy other vital U.S. needs in areas such as public safety, scientific research, Federal transportation infrastructure, and law enforcement. The National Telecommunications and Information Administration (NTIA) initiated strategies within the Plan to address the diverse needs of the spectrum. The document specifically calls out supporting Federal missions while "fostering the commercial systems that underpin the nation's economic growth and technological information."

The Plan sites the increasing spectrum needs of both the Federal Government and commercial users. The plan is oriented towards near and mid-term goals because the uncertainty of the future needs of the spectrum. The most relevant goals to this issue include:

- **Use of Commercial Services Where Feasible:** Federal regulations require Federal agencies to use commercial communications and spectrum-dependent services where possible. Improvements in technology have made using commercial communications more reliable but certain emergency related Federal uses may be too complex for commercial networks. Federal agencies cannot control commercial capacity directly so a plan to balance commercial and federal use of satellites when needed is proposed.
- **Flexible Approach to Incentives:** Currently, regulatory hurdles prevent Federal and non-Federal spectrum uses from efficiently sharing spectrum. Sharing the spectrum could allow Federal agencies to make underutilized spectrum available to non-Federal entities. This would lead to a more efficient use of the spectrum for all parties involved.
- **Spectrum Valuation and Economic Efficiency:** The Office of Management and Budget has instructed the Federal agencies to consider the economic value of radio spectrum when developing justifications for new systems. The NTIA has also discussed identifying and establishing incentives to promote more efficient and effective use of the spectrum.
- **Technical Efficiency:** NTIA engineers are developing more precise methods to improve management of the spectrum. By increasing efficiency and effectiveness of the spectrum, there should be an increase in the amount of time frequency assignments are in use.
- **Forecasting Trends:** Development of new spectrum management tools will improve quantification of Federal spectrum use and refine estimates of future requirements.

Though long-term use of the spectrum is unclear, steps are being taken by the Federal government to ensure that use of the spectrum is available to all parties while maintaining national security and economic wellbeing.

Issue FSI-3	**Potential radio frequency and electromagnetic interference Could Occur from Development Along US Route 301.** The US Route 301 corridor is expected to experience additional growth, particularly in the area immediately outside of Dahlgren's B Gate. Additional growth in this area could result in Radio Frequency Interference (RFI) / Electromagnetic Interference (EMI) impacting the proposed UAV vehicle ground area at NSF Dahlgren.

Growth along the US Route 301 corridor to the north and northwest of NSF Dahlgren is anticipated in the future. The 2013 King George County Comprehensive Plan has designated this area as the Dahlgren Settlement Area and much of the land on the comprehensive plan future land use map and corresponding zoning is identified as residential and commercial. The comprehensive plan states that this is the most densely developed area in the county. Future development plans for this area will include new commercial and residential development that will generate an increase in the amount of frequency spectrum users and devices.

Despite the economic benefits provided by development along the US Route 301 corridor, this increasing growth has the potential to adversely affect RF and EM energy work essential to NSWCDD programs at NSF Dahlgren. Growth along the north and west of the installation could potentially result in RF and EM interference, depending on the type of development. This could produce detrimental impacts to both civilians and military personnel due to the increase in demand for radio and EM use. Particularly impacted are operations in the northwest area of Mainside and areas immediately outside of NSF Dahlgren's B Gate. One are of concern is NSF Dahlgren's unmanned aerial vehicle UAV ground area. The remote operations of UAVs and their high demand for RF and EM communications could be at risk with future development.

Existing Tools

King George County Comprehensive Plan

The King George County Comprehensive Plan provides the goals and outlook for the future growth and development in the county. The plan identifies the community to the west of NSF Dahlgren as the Dahlgren Settlement Area, which is expected to experience growth in the future and continue as the most densely developed part of the county. The comprehensive plan goals encourage and support the continued operation and growth of NSF Dahlgren and will develop in ways to minimize conflicts with the installation. While the plan acknowledges general compatibility needs with NSF Dahlgren, it does not specifically mention the impacts of future growth on the frequency spectrum and interference between new community growth and military operations.

Sources: King George County Comprehensive Plan, 2013.

Issue FSI-4	**Potential Wind Energy Growth in Region Could Cause Line of Sight Interference Issues.** Wind developers have shown interest in the region for the placement of wind turbines and farms. Future development of wind energy devices within the region could interfere with tracking stations that use line of sight.

Local investment in wind energy is a beneficial development for alternative energy; however, it is a potential obstacle for NSF Dahlgren operations. The height of wind turbines can impact the line of sight between communication transmission sites.

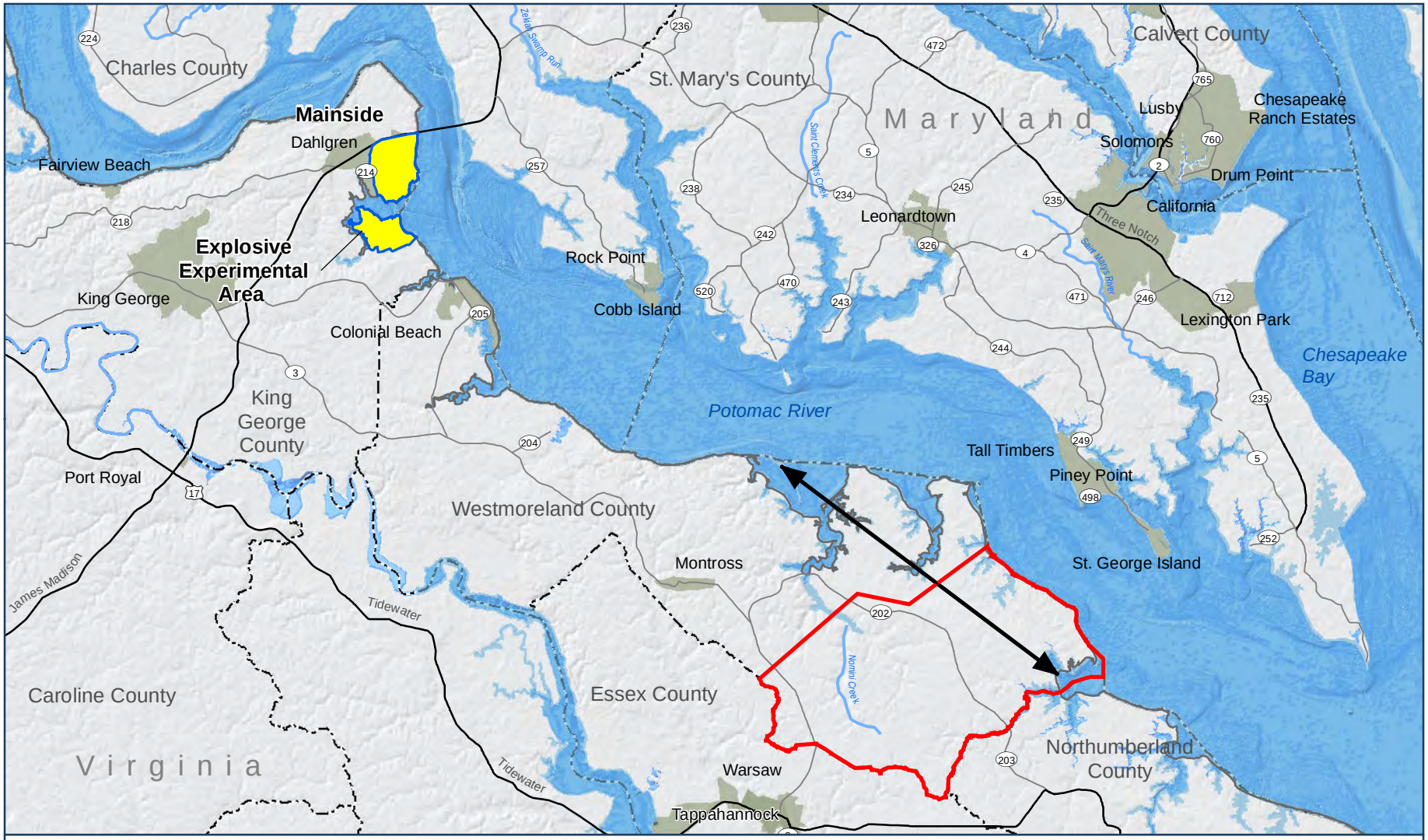
Both Maryland and Virginia are pursuing land-based and off-shore wind energy. Due to the economic viability of the region for this type of energy development, it is important to monitor wind turbine construction and its potential impact on base operations. The VCERC is currently studying the potential for wind energy production in shallow water. A recent study by the VCERC identified the southern portion of the PRTR as a potential area for offshore wind projects.

Private investment has been driving increased attention to the development of alternative energy sources at a local, state and national scale. NSWCDD is currently coordinating with local legislators, industry representatives and private universities to develop solutions that allow the coexistence of installation frequency testing and wind turbines. This work includes published research, technical reviews of wind turbine impacts, and a continuous relationship with the wind energy industry.

The presence of large scale wind farms in the area around NSF Dahlgren could present two compatibility concerns. In terms of frequency interference, large numbers of wind turbines can have the effect of distorting radio or similar types of communication by causing a Doppler effect from the large amount of rotating turbine blades. The second concern for wind turbines is frequency impedance. Commercial wind turbine towers can be hundreds of feet high and when situated close together can impact line of sight transmission signals.

One project identified as a concern for wind turbine development near NSF Dahlgren is the Callao Wind project in Westmoreland and Northumberland counties. NSF Dahlgren maintains a 400-foot tall transmission tower in Reedville, VA, in Northumberland County, approximately 50 miles southeast of NSF Dahlgren. The proposed Callao Wind energy farm, consisting of 157 turbines, would be located directly in the line of sight between NSF Dahlgren and the Navy tower in Reedville. The height of the turbines is estimated to be 558 feet. Despite the wind farm's 23-mile distance from the NSF Dahlgren, it has the potential to detrimentally impact the NSF Dahlgren mission.

The majority of the line-of-sight between NSF Dahlgren and the Reedville tower within the JLUS Study Area is located over the Potomac River and within the MDZ. However, a portion of the line-of-sight extends over Westmoreland County as identified in Figure 5-5.1.



Source: Dahlgren NSF, 2013

Fig5-5-1_NSF_Dahlgren_LOS_20141028_JKC.pdf

Figure 5.5-1: Line of Sight Concern

Existing Tools

DOD Energy Siting Clearinghouse

The Navy strives to balance operations and training requirements with community development in the vicinity of Navy land, sea, and air assets. These activities may include the development of renewable energy projects, transmission lines, residential/commercial structures, and other forms of development or alterations of land, air, and sea space.

To avoid potential mission impacts, the Navy collaborates with federal regulatory agencies, state and local governments, and the business community to communicate concerns early in the planning and development process and achieve compatible solutions.

The siting of wind farms in proximity to Navy installations is subject to review by the DOD Energy Siting Clearinghouse. The main responsibility of the DOD Energy Siting Clearinghouse is to comprehensively review and evaluate proposed energy projects and their possible effects on DOD operations. All proposed projects within military training routes or airspace must undergo the formal review process. Development that may impact communication line of sight may also be subject to review by the DOD Energy Siting Clearinghouse. With this process in place, it is unlikely that a project would be approved that would greatly impact the mission of the Navy.

Charles County, MD Wind and Solar Ordinance

Charles County has recently adopted a wind and solar ordinance for inclusion in the County's planning, zoning, and development regulations. Charles County allows both small, personal wind energy systems and large, commercial wind energy systems. Smaller uses are permitted in zoning districts by right and larger systems will require special exceptions in all zoning districts. Large wind energy systems are not to exceed 150 feet.

St. Mary's County, MD Comprehensive Zoning Ordinance

Small wind energy systems up to 150 feet in height are permitted as accessory uses to a principal use within all zoning districts and commercial communication towers are permitted with conditional standards in the RPD (Rural Preservation District), RCL (Rural Commercial Limited), RL-T (Residential, Low Density – Transitional), VMX (Village Center Mixed Use), TMX (Town Center Mixed Use), CMX (Corridor Mixed Use), CC (Community Commercial), I (Industrial), and OBP (Office and Business Park) Zoning Districts.

The St. Mary's County Comprehensive Zoning Ordinance provides height exemptions for public communication towers in all zoning districts and for commercial communication towers in residential, mixed-use, and industrial / office park zoning districts with conditional use approval. The ordinance allows small wind energy systems up to 150 feet in all zoning districts as an accessory to a principal use. These allowances may create compatibility issues due to height regulations and potential radar interference proximate to aviation facilities.

Maryland Draft Model Small Wind Ordinance

In 2008, the State of Maryland released a model wind ordinance available for jurisdictions in the state. This draft ordinance is available to communities to use as a template to develop their own wind ordinances to regulate wind energy development in the future.

Virginia Model Ordinance Community-Scale Wind Energy Projects

The Commonwealth of Virginia released a model ordinance for community-scale wind energy projects in January 2013. This ordinance is meant to provide an example wind ordinance that jurisdictions can model after or adopt to provide regulations for wind energy development within their boundaries. The model ordinance is a template that can be filled out with the jurisdictions information or changed as they need it to fit their needs.

Housing Availability

Housing availability addresses the supply and demand for housing in the region, the competition for housing that may result from changes in quantity of military personnel, and the supply of military family housing provided by the installation.

Compatibility Assessment

Issue HA-1	**Limited Off-base Housing Options for Military Workforce.** Local jurisdictions' growth policies do not address military workforce housing needs. The lack of sufficient quantities of lodging has resulted in military workforce commuting to NSF Dahlgren from as far away as Fredericksburg, which requires a minimum commute time of 45 minutes each way.

Off-installation housing in King George County is limited. The 2013 Census states that there are 9,611 housing units in King George County. NSF Dahlgren employs approximately 3,900 civilians, 900 military and over 3,700 contractors, and the installations' commands serve as the largest employer in King George County. There is an approximate workforce of 8,500 people at the installation which exceeds the number of households in King George County. Therefore, not all personnel employed or stationed at NSF Dahlgren lives in King George County – some may commute from as far west as Fredericksburg and north and east as Charles County, Maryland.

There are 203 housing units at NSF Dahlgren comprising single family residences and townhomes. Rent for these units starts at $1,399 per month. Rental housing is also limited in the immediate area. According to the 2013 US Census, in King George County the average owner occupied vacancy rate is 1.2 percent and the average rental vacancy rate is 6.4 percent. Median rent in King George County, Virginia, is estimated at $1,099 per month according to averaged 2011-13 data from the US Census Bureau. The 2013 basic allowance for housing (BAH) from the Navy begins at $1,011 for an enlisted service member (E-1 Grade) without dependents – slightly below the median area housing cost and below the cost of housing at NSF Dahlgren.

NSF Dahlgren maintains a Housing Service Center to assist in providing housing support for all families and unaccompanied personnel assigned to the installation. This includes assisting families who are in search of family housing which is offered on the installation by Lincoln Military Housing. On-installation housing ranges from single family dwellings to townhomes, all managed through a Public Private Venture (PPV) between Lincoln Military Housing and the Navy. Unaccompanied Housing (UH) is provided for service members in two buildings situated inside the installation near the Main Gate. Several military billeting facilities are also located proximate to or on the installation.

Source:
http://www.cnic.navy.mil/regions/ndw/installations/nsa_south_potomac/installations/nsf_dahlgren/ffr/housing_and_lodging.html;
http://www.dahlgrenhousing.com/;
http://lincolnmilitary.com/installations/dahlgren-nsf/

Existing Tools

King George County Comprehensive Plan

King George County's Comprehensive Plan identifies two primary residential growth areas – the Dahlgren Primary Settlement Area (PSA) and the Courthouse PSA – where the majority of future residential growth is expected to be directed. The exceptions to this policy are the allowance of residential development in areas with existing community facilities or with approvals prior to the 2013 update to the Comprehensive Plan.

Within the Comprehensive Plan, one of the residential core standards identified for both the Courthouse and Dahlgren PSA's is that development is to include interconnected roads, parks and open space, and a mixture of housing types and affordability. According to the Comprehensive Plan, in 2013 the Courthouse PSA contained 1,495 housing units and roughly

16 percent of the County's population, while the Dahlgren PSA contained 1,096 housing units and roughly 12 percent of the County's population. This amounts to approximately 30 percent of the County's housing units and about 28 percent of the County's population. While this is an adequate match, it is unclear whether or not the available housing promotes an efficient mix of types and affordability. The Potomac River / North area (also known as the Rural Development Area) contains the County's largest population and housing counts, with approximately 51 percent of the County's population and roughly 4,625 housing units, which is well over half of the County's housing stock. It can be assumed, due to the rural nature of this area, that the majority of these housing units are single family units located in residential subdivisions, which are less likely to house NSF Dahlgren personnel unless they are accompanied by family.

According to the supporting data within the Comprehensive Plan, several important housing factors were identified:

- The number of households in the County increased by 25.6 percent between 2000 and 2010.
- Of the total households, 88.4 percent of the households (8,376) were owner occupied in 2010 and 21.6 percent (1,808) were rental units.
- Single family structures continue to dominate the housing supply at 77 percent.
- The median value of housing units increased from to $123,200 (unadjusted dollars) in 2000 to $289,200 (unadjusted dollars) in 2010.
- Median contract rents increased from $622 per month in 2000 to $999 per month in 2010.

Through this supporting data, it is evident that household stock, median housing value and median housing rents have all increased since 2000. While the increase in housing stock is good, the surge in housing and rental values may be causing affordability issues for some of the personnel at NSF Dahlgren. Additionally, it is evident that the majority of households are owner occupied, single family structures. This may also be causing affordability and availability issues for personnel at NSF Dahlgren, due to the fact that there is a lack of rental units, and some military personnel may not be looking to own single family homes.

Within the Land Use Plan of the Comprehensive Plan a list of future housing goals are provided including:

- Provide for a full range of housing choices for all income groups, families of various sizes, seniors, and persons with special challenges.
- Preserve the County's existing housing stock through housing rehabilitation resources to maintain the affordable housing that already exists in the community.
- Facilitate the creation of a reasonable proportion of the County's housing as affordable units through additional homeownership opportunities for individuals and families earning between 60 percent and 80 percent of area median income and affordable apartments for individuals and families earning up to 60 percent of the area median income.
- Strive for innovation and partnerships in the creation of model ordinances, policies, and programs in the area of providing expanding housing opportunities for low- and moderate income persons.
- Facilitate the affordable housing activities of other entities within the County, including construction of affordable housing units, rehabilitation of existing housing, homeownership training, and marketing of assistance programs.
- Promote high density housing within walking and convenient commuting distance of employment, shopping, and other activities, or within a short walk of a bus or transit stop, through "mixed use" developments, residences created on the upper floors of nonresidential downtown buildings, and other creative strategies.
- Support the renewal of neighborhoods suffering from physical deterioration.
- Assure a quality living environment and access to public amenities for all residents, present and future, of the County, regardless of income.

Several subdivisions exist along US Route 301, and directly north of NSF Dahlgren, but most of these are comprised of less than 100 homes each, and do not completely satisfy housing demand in the area around NSF Dahlgren. Aside from the Dahlgren PSA, the closest area to NSF Dahlgren in King George with a high housing population is the Courthouse PSA, approximately 20 minutes southwest of NSF Dahlgren. According to the land use map provided in the Comprehensive Plan, it is evident that the majority of housing available proximate to NSF Dahlgren includes low-density, single family residential, with the exception of some high density residential scattered along US Route 301. The plan states that in 2010, while 77 percent of the housing units in the County were single family, 12 percent were mobile homes, and only 11 percent were multi-family units, showing a lack of multi-family rental units. This portrays a need for additional housing types and additional rental units, particularly within the two PSA's proximate to NSF Dahlgren.

In regards to future housing stock, the Comprehensive Plan identifies projections for years 2020 and 2030. The 2020 projection estimates a total of 11,368 housing units in the County, while the 2030 projection estimates a total of 14,100 housing units. While these are only projections, an increase in housing availability could potentially bring a larger population to the County, and even to NSF Dahlgren, creating induced demand.

Sources: King George County Comprehensive Plan, 2013; Census 2010, King George County Subdivision Map, 2012.

Naval Support Facility Dahlgren Housing Service Center

NSF Dahlgren's own Housing Service Center assists in providing housing support for all families and unaccompanied personnel assigned to the installation. This includes assisting families who are in search of family housing. According to their website, a total of 203 on base homes, ranging in size from townhomes to colonials are managed by a military housing company and the Navy through a PPV.

The Housing Service Center also assists unaccompanied personnel such as bachelors. Unaccompanied Housing (UH) houses approximately 246 service members throughout two buildings, which are conveniently located on base near the Main Gate. Furthermore, there are several military billeting facilities proximate to or located on the base. These include the Potomac Inn, which accommodates 198 permanent party unaccompanied enlisted residents, and the Navy Gateway Inns and Suites which is comprised of five facilities with accommodations for 94 transient officers, enlisted and authorized civilian guests.

Source: http://www.cnic.navy.mil/regions/ndw/installations/nsa_south_potomac/installations/nsf_dahlgren/ffr/housing_and_lodging.html

Findings

- Households increased with housing value and rental costs over the past 10 years. This means more single family residential for the County and lower affordability for NSF personnel.
- Housing counts done by county are not same as US Census counts.
- A large majority of housing units are single family, owner occupied. Shows the need for more housing types, including rental units.
- The comprehensive plan identifies good future goals for housing availability and affordability, although it is not clear whether or not they will be adhered to in areas proximate to NSF Dahlgren.
- Housing projections for the future detail significant changes in stock. This could either help the availability in the County, or hurt it by bringing induced demand. Either way, a good portion of those additional housing units should be a mix of types and costs.
- The NSF Dahlgren Housing Services Center is a good tool for on base housing at NSF Dahlgren, although it is unclear if they give any assistance to military personnel for off-base housing.
- The NSF Dahlgren Master Plan does not identify any information for off-base housing nor does it reference the lack of rental housing availability off-base.

Issue HA-2	**Additional Housing Capacity Needed for Military Transient Students.** On base lodging often turns students away due to high occupancy rates and not enough on base housing to support the transient student population. The lack of sufficient quantities of lodging has resulted in students commuting to NSF Dahlgren from as far away as Fredericksburg, which requires a minimum commute time of 45 minutes each way.

The housing opportunities for the transient student population at NSF Dahlgren are limited and usually have a high rate of occupancy. Unaccompanied Housing (UH) is provided for 246 service members in two buildings (one of which is the Potomac Inn, accommodating 198 permanent party unaccompanied enlisted service members) which are both located near the Main Gate and there are several military billeting facilities proximate to or located on the installation – one being the Navy Gateway Inn & Suites.

Due to the shortage and cost of housing on the installation, and despite the average rental vacancy rate in King George County, students may not be able to find affordable housing within the immediate NSF Dahlgren area. The majority of the NSF Dahlgren transient student population tends to live in areas throughout King George and Westmoreland counties, though some commute from as far as Fredericksburg, VA. Though NSF Dahlgren is approximately 40 minutes east of Fredericksburg, there are very few towns in the immediate area. King George County, the Town of Colonial Beach, and the community of Port Royal are the only areas in Virginia, beside NSF Dahlgren, where housing can be found under a 30 minute commute to the installation.

Across the Potomac River in Maryland, are the small towns of Bel Alton and La Plata which are an approximate 25 minute drive from the installation.

Sources:
http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_3YR_B25058&prodType=table; NSF Dahlgren Master Plan, 2011

Existing Tools

Naval Support Facility Dahlgren Master Plan

The NSF Dahlgren Master Plan identifies several housing goals for the installation, one of which is to locate support functions, such as housing, in the Town Center. The Town Center complex at NSF Dahlgren is where the majority of housing is located, and is proximate to the Main Gate.

A description of the Lincoln Military Housing indicates that there are 107 single family homes and 125 townhouses that serve the needs of military families stationed at NSF Dahlgren. According to the plans summary of commands and activities table, approximately 260 units are used for on base housing and / or by Lincoln Military Housing. Unaccompanied Housing (UH) is provided for 246 service members in two buildings (one of which is the Potomac Inn, accommodating 198 permanent party unaccompanied enlisted service members) which are both located near the Main Gate and there are several military billeting facilities proximate to or located on the installation – one being the Navy Gateway Inn & Suites.

Source: NSF Dahlgren Master Plan, 2011.

Naval Support Facility Dahlgren Housing Service Center

The Housing Service Center at NSF Dahlgren assists in providing housing support for all families and unaccompanied personnel assigned to the installation. According to their website, a total of 203 on base homes, ranging in size from townhomes to colonials are managed by Lincoln Military Housing through a Private Public Venture.

The Housing Service Center also assists unaccompanied personnel such as bachelors and transient students.

Source:
http://www.cnic.navy.mil/regions/ndw/installations/nsa_south_potomac/installations/nsf_dahlgren/ffr/housing_and_lodging.html

Findings

- The NSF Dahlgren Master Plan does not identify any information for off-base housing nor does it reference the lack of rental housing availability off-base.
- It is unclear the prices for housing on-base and how those BAH rates compare to off base housing values and rental costs.
- The master plan details on base housing opportunity, which is slim. Only 125 townhouses exist, which means the wait list for single sailors or transient students to get into one of them is most likely long.
- Unaccompanied housing is only provided in two buildings, which is most likely not sufficient enough to support the needs at NSF Dahlgren.
- While having military billeting facilities is a positive aspect for the base, they are probably not sufficient enough to support the needs.
- A large portion of the base is deemed open space and therefore underutilized due to safety and RDT&E concerns. Some of this area could be potential locations for future housing or a new complex.
- Unclear if community services provided are sufficient for population.
- The NSF Dahlgren Housing Services Center is a good tool for on base housing at NSF Dahlgren, although it is unclear if they give any assistance to transient students. It is also unknown if there will be additional housing opportunities added to the complex in the future, although the plan mentions a move towards mixing uses.

Infrastructure Extensions

This factor covers the extension or provision of infrastructure (i.e., roads, sewer, water, etc.). Infrastructure plays an important, but varied role in land use compatibility. On the positive side, infrastructure can enhance the operations of an installation and community by providing needed services, such as sanitary sewer treatment capacity and transportation systems. On the other hand, infrastructure can become an encroachment issue if enhanced or expanded without consideration for how future development may occur. The extension or expansion of community infrastructure to a military installation or areas proximate to an installation have the potential to induce growth, potentially leading to incompatible uses and conflicts between military missions and civilian communities. Through careful planning, the extension of infrastructure can serve as a mechanism to guide development into appropriate areas, protect sensitive land uses, and improve compatibility of land uses and military missions.

Compatibility Assessment

Issue IE-1	**Infrastructure Improvements / Extensions May Induce Growth Close to NSF Dahlgren.** The new substation on base provides many mutual benefits for Dahlgren and King George County but also has the potential to induce growth due to an increase in capacity. The extension of additional / new services to the base could create the potential for growth inducement in areas subject to impacts from Dahlgren activities and operations.

With development growth, the area surrounding NSF Dahlgren experienced an increase in electricity demand which is expected to increase. In 2011, power outages at NSF Dahlgren were reported causing a loss in productivity. Later that year, Dominion Virginia Power announced plans to build a 10-mile overhead 230-kV transmission line to improve service to NSF Dahlgren due to expected electricity loads exceeding the capacity of the system at that time. The line has been completed and runs from an existing line on State Route 3 along US Route 301 to a local substation at NSF Dahlgren. NSF Dahlgren and the greater community benefit from the extension since it supports additional capacity and economic development.

The increased power to the area will likely spur additional development consistent with King George County growth goals. Since the line begins on the western edge of NSF Dahlgren and runs southwest through the county, it is likely to induce development in this area. Enabling more growth

around NSF Dahlgren through infrastructure extensions is a potential noise and safety concern for military operations. Due to the route of the transmission line, the most favorable area for growth will be the properties near Mainside and the EEA, and within the Dahlgren PSA.

Source: https://www.dom.com/about/electric-transmission/dahlgren/index.jsp;

Existing Tools

Naval Support Facility Dahlgren Master Plan

In the Capital Improvements Plan section of the Master Plan, electrical cable upgrades and electrical substation upgrades are included proposed projects, although they are referred to as proposed projects associated with Navy Facilities Engineering Command (NAVFAC) Washington and not specifically NSF Dahlgren. Since the Master Plan was developed the same year as the inception of the new transmission line and substation at NSF Dahlgren, there is no other mention of it in the Master Plan.

Source: NSF Dahlgren Master Plan, 2011.

Environmental Impact Statement for Outdoor Research, Development, Test & Evaluation Activities, Naval Surface Warfare Center, Dahlgren Division

This EIS was developed by the Navy in 2012 to evaluate the potential effects of expanding RDT&E activities within the PRTR and EEA complexes, the Mission Area, and the special-use airspace at NSF Dahlgren. The EIS Executive Summary identifies environmental impacts associated with the different alternatives that were proposed. In regard to impacts on utilities, the no action alternative states:

> *NSWCDD's current power requirements are being adequately supplied by the power grid and NSF Dahlgren's auxiliary generators. RDT&E activities would have no direct or indirect impacts on utilities. Dominion Virginia Power (DVP) has submitted an application to build a new 230 kilovolt transmission source and substation at NSF Dahlgren, to be completed in 2014. This would meet NSF Dahlgren's needs and King George County's growth and development.*

It is important to note that the other alternatives, along with the no action alterative, state that RDT&E activities would have no direct or indirect impacts on utility systems.

Source: NSWCDD Outdoor RDT&E Activities EIS, 2013.

Hearing Examiner's Report on the Proposed Dahlgren 230 kV Transmission Line and Substation, State Corporation Commission

Issued in 2012 during the State Corporation Commission (SCC) approval process, the Hearing Examiner's Report found that there was a need for the company's proposed project, and that one of the proposed routes would have minimized adverse impacts on the assets and environment of the area concerned.

The report includes testimonies from various groups of people, including the Dominion Virginia Power Company. Several of the testimonies mentioned the requirement of the project in order to provide improved service to an area of the county that had experienced steady commercial growth that is expected to continue into the future. Reasons for this growth include a new shopping center which comprised a Walmart supercenter, a new extension of Mary Washington University, and a projected growth at NSF Dahlgren. According to some of the testimonials, the electric load in the area near the project was expected to reach and surpass the system's capacity at that current time and the project would resolve the distribution loading concerns and the reliability of the existing transmission system in the area. One of the testimonials stated that the project would provide a contingency and remove the risk of significantly long duration outages that would occur with the configuration that was present at the time.

The report also assessed the environmental impacts that were addressed in the proposed project proceedings, including air and water quality, impacts on biological and cultural resources, and compliance with the Chesapeake Bay Preservation Act. While the project was designed to meet the growing load in the area, the report also states it assists in the continuation of

economic development and the viability of the base operations, which equates to new businesses, population growth, and commercial development for King George County, and new electrical infrastructure to meet the growing research and development needs at NSF Dahlgren.

Source: https://www.dom.com/about/electric-transmission/dahlgren/pdf/08-06-12-hearing-examiner-report.pdf

Findings

- The EIS developed for the RDT&E activities at NSWCDD detail the proposed transmission lines and substation and mention that these expanded activities will have no direct or indirect impacts on the utility systems. Activities include laser testing, electromagnetic energy use, and expanded ordnance use.

Land, Air and Sea Space Competition

Issue LAS-1	**Nine (9) Mile Gap In Restricted Airspace Between Dahlgren and Naval Air Station Patuxent River (NAS PAX).** There is a nine mile distance between Dahlgren's restricted airspace and NAS PAX's restricted airspace. Control of this air space turns over to FAA. Dahlgren is working with FAA to get a Certificate of Authorization (COA) to connect NAS PAX airspace with Dahlgren airspace.

The military manages or uses land and air space to accomplish testing, training, and operational missions. These resources must be available and of a sufficient size, cohesiveness, and quality to accommodate effective training and testing. Military and civilian air and sea operations can compete for limited air and sea space, especially when the usage areas are in close proximity to each other. Use of this shared resource can impact future growth in operations for all users.

The land, air, and sea spaces used by the military can be owned by the DOD, designated for DOD use by a federal or state agency, provided through easements or other agreements with public or private entities, or maintained as a historic usage right. Public and private requests to share or assume some of these resources may have a negative impact on military training and test objectives.

Compatibility Assessment

While the airfield at NSF Dahlgren does not currently support fixed-wing aircraft operations, the installation maintains restricted airspace for military operations. Rotary wing aircraft (helicopters), which use the airfield periodically and UAVs are the primary aircraft using the airspace surrounding the installation. Due to the proximity of NSF Dahlgren to NAS Patuxent River (NAS PAX) and particularly Webster Field, it is important to coordinate between the different users of the regional airspace to deconflict and maintain safe operations.

Nine miles separate the restricted airspace for NSF Dahlgren from the restricted airspace for NAS PAX. Control of this air space turns over to FAA. NSF Dahlgren is working in conjunction with NAS PAX as well as the Mid-Atlantic Aviation Partnership (MAAP) lead (Virginia Tech) to develop a strategy for obtaining an FAA Certificate of Authorization (COA) to connect this nine mile gap for the purposes of full system integration testing.

Existing Tools

Federal Aviation Administration Certificate of Waiver or Authorization

Operators of airspace can submit applications to the Air Traffic Organization of the FAA for a COA in order to have authorization for a specific airspace activity. Once applications are completed and submitted, the FAA conducts comprehensive technical and operational reviews to assure the operations that are covered by the COA are safe and compatible. In some cases, provisions or specific limitations may be imposed as part of the approval process, to ensure safe operations with other users of the

airspace. While COA's usually pertain to the operation of Unmanned Aircraft Systems (UAS), this tool would apply here due to the fact that the airspace for both bases is restricted airspace, and the COA would create a joint airspace.

Source: http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/aaim/organizations/uas/coa/

Issue LAS-2	**NSWCDD's Range Stations on Private Land Subject to Disruption / Termination of Use.** Range stations on private land are subject to lease agreements with private residents. A change in property ownership or status could jeopardize the Navy's continued use of these stations in their current location.

Coordination between military and private land is essential for maintaining military operations at NSF Dahlgren. The PRTR includes leased range stations that are strategically placed along the Potomac River. Many of these range stations are located on private and federal land that is leased to NSWCDD. The range stations are used to collect key test and evaluation information and are vital in supporting safe operations during ordnance testing. Also, many of the range stations have sound monitoring equipment for collecting sound data to assist in sound management, improve real time sound monitoring, and identify other factors associated with sound propagation. Some of these stations are manned by personnel who provide surveillance to keep the ranges safe and effective.

The loss of any range stations could adversely affect the safe conduct of weapons firing along the PRTR. As the land along the Potomac increases in desirability and value, properties may be subject to changes and transfers in ownership which could jeopardize these lease agreements.

NSWCDD must renegotiate agreements with incoming property owners to ensure the continued use of range stations. The area of the PRTR with the heaviest concentration of testing is between the two most heavily populated portions of the PRTR. NSF Dahlgren receives complaints from area residents, and while outreach efforts are considerable, new residents moving to the area will likely be unfamiliar with the PRTR operations adding to the complexity of renegotiating leases.

Source: NSF Dahlgren Master Plan, 2011

Issue LAS-3	**Competition for Use of Waterways Places Limitations on Water Range Operations.** Although NSWCDD coordinates the use of the Potomac River Test Range with the Coast Guard to clear boaters from the waterways, testing is subject to delay or cancellation due to the presence of boaters, marine commercial freight movements, commercial fishing, and recreational boating on the Potomac River.

Many of the waters adjacent to and within NSF Dahlgren are home to numerous indigenous freshwater and saltwater species of fish. Many local fishers use the Potomac River for both recreational and commercial uses. The beaches and trails alongside the river also attract a relatively large number of recreational boaters. As one of the largest rivers along the Atlantic coast of the United States, it serves as a prominent natural feature for both regional residents and tourists.

While large commercial vessels cannot sail through the PRTR, smaller boats such as fishing vessels, tugboats and recreational boats are small enough to maneuver through the narrower parts of the river and make their way to navy operational areas. This creates problems due to unwanted traffic in prohibited and restricted testing ranges. The public is allowed to boat and fish along the Potomac in the absence of warnings that the range has the potential to become active. As described in Public Trespassing Issue PT-1, public access to prohibited areas is disallowed at all times. Consequently, civilian boats are not permitted within 100 yards of the shoreline of the NSWCDD.

When ranges are active, military personnel work with the U.S. Coast Guard to clear the waters of any civilian vessels. Of the three danger zones, the MDZ is the most hazardous due to its increased level of activities. However, it is important to monitor boaters in all danger zones during range operations. Adequate communication and coordination between these civilians and military personnel is essential to maintain maritime safety.

The competition for sea space becomes an issue when maritime traffic causes delays or cancellations of testing activities due to the time and resources required to ensure the public safety within the PRTR.

The Potomac River Fisheries Commission helps in the coordination process by regulating all recreation and commercial fishing, crabbing, oystering and clamming on the main stem of the tidal Potomac River. Other involved parties include the Maryland Department of Natural Resources (DNR), the Virginia Marine Resources Commission (VMRC) and the Department of Game and Inland Fisheries (DGIF), and with the other Atlantic coastal states through the Atlantic States Marine Fisheries Commission (ASMFC).

Source: 33 CFR 334.220

Existing Tools

Regulations for Safe Boating in the Middle Danger Area of the Potomac River- Dahlgren Brochure

This brochure details the Middle Danger Area of the PRTR and identifies some regulations for boaters in the interest of the safety of watercraft traffic on the Potomac River. The brochure states that entry into this area is hazardous in general to watercraft when guys, ordnance, or other items are being tested by personnel at NSF Dahlgren. Pursuant to the brochure, in order to assure that no watercraft is endangered by firing, NSF Dahlgren stations range boats with white hulls and orange superstructures in the proximity of areas rendered hazardous by firing. These boats and their operators have the responsibility of insuring that no watercraft is endangered as a result of range operations or firing. These boats are normally stationed at one of several range boat stations. The brochure details a few regulations pertinent to watercraft operators and how to comply with safety measures. These regulations are:

- When range boats are flying a red flag, watercraft must not enter any portion of the danger area or operate in the proximity thereof without first having obtained permission from the captain of the nearest range control boat. A siren sounded at a watercraft from a range control boat is a signal to come alongside for instructions as to how to proceed and areas that must be avoided.
- All craft desiring to enter the Middle Danger Zone to proceed in or out of Upper Machodoc Creek during firing hours will be instructed by the patrol boats.
- Firing schedules are arranged to cause minimum inconvenience to river traffic and generally the range is not closed for long periods of time. It is possible that firings may be conducted in the Lower Danger Area. If this occurs, range boats will be dispatched to the area.
- Entry to all danger areas described in the U.S. Coastal Pilot 3, Atlantic, when firing is in progress without specific clearance by proper authorities is prohibited by regulations promulgated by the Corps of Engineers, U.S. Army, pursuant to the authority of Sections 1 and 3, Title 33, U.S. Code. Although captains of the range control boats are authorized to enforce these regulations, NSF Dahlgren, desires to cooperate with and assist operators of all watercraft operating in the PRTR Middle Danger Area.

Source: NAVSEA Dahlgren Brochure: Regulations for Safe Boating in the Middle Danger Area of the Potomac River.

Naval Support Facility Dahlgren Public Health Assessment

The Public Health Assessment (PHA) developed for NSF Dahlgren details one public health issue that relates to safety for recreational users of the Potomac River – that members of the surrounding communities have been concerned about the safety of using the river due to NSWCDD activities and specifically coming into contract with unexploded ordnance (UXO) in the river or on beaches, and navigational hazards in the river such as unmarked pilings.

The PHA describes the evaluation of the issue, in which mitigation measures are detailed. Aside from markers and signs to educate watermen, the PHA states that NSWCDD employs range boats to warn recreational boaters of resting on the river. Additionally, the boats use red flags, buoys and sirens to warn river users. Other methods of monitoring public safety for river users include surveillance cameras, radio communications between the Range Control Office and river users, and warning signage. The conclusion of the issue states that boaters who consult charts, follow safe boating practices and follow direction of range control boats will not be exposed to safety hazards.

Source: NSF Dahlgren Public Health Assessment, 2006.

Navy Instruction 3571.4: Operational Range Clearance Policy

OPNAV Instruction 3571.4 is the Navy Instruction for operational range clearance policy for Navy bases, which includes NSF Dahlgren and the associated PRTR. As the instruction describes, the objective of range clearance is to sustain readiness, be environmentally responsible, and to maintain public safety. One of the mandates in the instruction is for outreach programs to be established within range clearance plans to educate the public about hazards from UXO and of trespassing on operational ranges. This instruction also includes the mandate for recording all range clearance activities, which would include monitoring and assessing the use of civilian and commercial watercraft and their potential for public trespassing along the NSF Dahlgren waterfront access.

Source: OPNAV Instruction 3571.4, Operational Range Clearance Policy

Northern Neck-Chesapeake Bay Public Access Authority Act

The Northern Neck Chesapeake Bay Public Access Authority Act was established to increase the use of existing public-access sites along the bay area. The Act establishes a public access authority known as the Northern Neck Chesapeake Bay Public Access Authority, also known as the Authority. The Authority is able to determine public access site locations based on their communication with the residents of the communities. These discussions between the Authority and the residents are a good starting point for future communication with NSF Dahlgren, but must evolve further. With this communication the Authority may be able to assist the community and NSF Dahlgren by communicating the operations and missions of the installation to the public in an educational manner.

Source: http://law.lis.virginia.gov/authorities/northern-neck-chesapeake-bay-public-access-authority-act

Public Affairs Office, Naval Support Activity South Potomac

The PAO provides a listing of NSWCDD tests, which can be found on the NSWCDD website and via a toll-free number. The PAO also keeps a list of all civilians that have requested to be notified prior to tests with higher than normal levels of noise. Their information is easily accessible through the internet.

Source: http://www.navsea.navy.mil/nswc/dahlgren/EIS/3-Ch3.pdf

Potomac River Fisheries Commission

The Commission regulates all fishing on the tidal main stem of the Potomac between Washington, DC and the Chesapeake Bay, exclusive of the tributaries on either side of the river. They ensure that boaters and fishermen know each of the four jurisdictions that has the authority to publish and enforce rules, regulations and laws dealing with such fishing matters as seasons, size limits, creel limits and licensing requirements. While the Commission helps to regulate fishing in the Potomac, they do not have authority to regulate recreational or commercial boating activities.

Source: http://www.prfc.us/sports/fishing_potomac.html

Findings

- Although there are several tools that are used to notify the public of NSF Dahlgren operations and range activities, none of these tools specifically address competition for waterways- only the PAO website notifies the public on testing schedules for NSF Dahlgren PRTR use.
- Range Safety is clearly an issue that NSF Dahlgren and NSASP personnel deal with on a regular basis.

- Range Safety brochures discuss safety measures for educational outreach purposes, but do not warn boaters of safety repercussions for coming to close to, or into the PRTR, unadvised.
- The Navy instruction details regulations and policy for range clearance, and mandates formal outreach or public notification of range clearance activities.
- According to the PRFC, it is the boaters' responsibility to know the laws where they are fishing, boating, crabbing or oystering.

Land Use

The basis of land use planning and regulation relates to the government's role in protecting the public's health, safety, and welfare. Local jurisdictions' general plans and zoning ordinances can be the most effective tools for preventing or resolving land use compatibility issues. These tools ensure the separation of land uses that differ significantly in character. Land use separation also applies to properties where the use of one property may adversely impact the use of another. For instance, industrial uses are often separated from residential uses to avoid impacts from noise, odors, lighting.

Land use planning around military installations is similar to the process for evaluating other types of land uses. For instance, local jurisdictions consider compatibility factors such as noise when locating residential developments near commercial or industrial uses. As the land between local municipalities is developed – or the land between a local municipality and the perimeter of a military installation is developed both entities are affected. New residents, tenants, or building owners are typically not fully aware of the implications of locating in close proximity to an active military installation and / or training area.

Compatibility Assessment

Issue LU-1	**Additional Growth in Military Influence Areas May Impair Use of Dahlgren's Aviation Assets.** The existing runway is constrained for use by fixed wing aircraft due to the location of growth nodes in King George County and the current airspace classification. Additional development of certain densities / intensities within airport approach and departure corridors could render aviation assets unusable.

The NSF Dahlgren airfield is currently only used for helicopter and UAV operations, but could be reconfigured to accommodate fixed-wing aircraft in the future. In the absence of an AICUZ study which would define safety zones, aircraft noise impacts and imaginary surfaces for vertical obstructions outside the fence line, the current use of the airfield results in an existing condition conducive to development outside the installation.

Current utilization of the airfield, the potential for future collaboration, and unrestricted airspace emphasize why the airfield at NSF Dahlgren is a valuable asset that could be utilized for expanded aviation missions in the future. Future use of the airfield is dependent on compatible development that considers appropriate land uses, residential densities, and non-residential intensities within safety zones and approach and departure corridors.

Given the intent of King George County to develop land in proximity to the installation, an increase in higher density residential uses and non-residential intensities which encourage the congregation of people, may be incompatible with an increase in activity at the airfield. The area most likely impacted by future installation activities includes the community of Dahlgren immediately west of NSF Dahlgren and the area north and northwest of NSF Dahlgren across US Highway 301.

Per the King George County Comprehensive Plan, a majority of residential and commercial development is anticipated to be directed within the

Dahlgren and Courthouse PSAs. There has been some recent growth in the communities around NSF Dahlgren, including residential subdivisions, restaurants, and commercial development, particularly along US Route 301 in the Dahlgren PSA and in Colonial Beach. While a majority of the residential development is low density located within subdivisions, some medium and high density residential uses, commercial development including the Walmart supercenter, and the University of Mary Washington campus are located along US Route 301. These developments may act as catalysts for additional development.

Source: King George County Comprehensive Plan, 2013.

Existing Tools

King George County Comprehensive Plan

The King George County Comprehensive Plan provides descriptions on existing land use and proposed future land use goals for areas proximate to NSF Dahlgren including the Dahlgren PSA.

Existing land use in the Dahlgren PSA contains large concentrations of commercial and residential development, particularly along US Route 301 and State Route 206. Several large subdivisions exist adjacent to the western and southern boundaries of the installation, most of which are situated along these major thoroughfares. The comprehensive plan existing land use map identifies several different land uses within these areas including agricultural, industrial, and residential. Residential uses along the southern border of NSF Dahlgren are low density and do not pose safety concerns associated with air operations. Residential uses along US Route 301 range from low to high density, and are located in areas where potential safety zones could be defined if a fixed-wing air mission was reintroduced at NSF Dahlgren. While it is unclear whether these uses would be considered incompatible based on their geography, the current primary runway orientation suggests the possibility.

In regard to future land use, within the growth management concept provided in the plan, one land use goal pertains specifically to uses within the vicinity of NSF Dahlgren:

> *Encourage the majority of residential and employment development to locate in and around the Courthouse and the Dahlgren Primary Settlement Areas, each with a mix of land uses and densities.*

While promoting mixed uses in clustered PSAs to encourage economic development while protect rural character achieves the county development vision, it also has the potential to encourage incompatible development along the northwest boundaries of NSF Dahlgren along US Route 301. Encouraging the majority of residential and commercial development in the Dahlgren PSA could generate safety concerns if fixed wing air missions were reintroduced to NSF Dahlgren. Conversely, developing within a potential safety zone in advance of an expanded mission creates an existing condition that could impact whether a new or expanded mission would be considered.

One of the key policies noted in the plan for the Dahlgren PSA states the possibility for potential rezoning to more dense residential and mixed-use zoning districts. This could also promote safety concerns due to the possibility of higher densities and congregations of people incompatible with airfield safety zones.

Source: King George County Comprehensive Plan, 2013.

Issue LU-2	**Portions of the King George County's Comprehensive Plan Goals and Future Land Use are Incompatible with Military Operations.** King George County's recently updated Comprehensive Plan designates the area outside of Dahlgren as a high growth area, encouraging compact forms of development with varying densities, which is potentially incompatible in future safety zones, noise zones, and areas that may require vertical limits to preserve airfield capabilities. Additional growth in these areas requires proper siting and development guidelines that would allow for the development of higher densities / workforce housing in areas proximate to the installation yet outside military compatibility areas.

NSF Dahlgren hosts RDT&E activities and its tenants test a variety of weapons systems. Mission activities at NSF Dahlgren include the use and detonation of ordnance, high-powered electromagnetic energy systems, high-power lasers, chemical / biological simulants, and the use of unmanned aerial, surface, and ground vehicles. The use and testing of these systems helps to ensure their safe operation for the users, while developing and improving upon better delivery systems and accuracy of weapons.

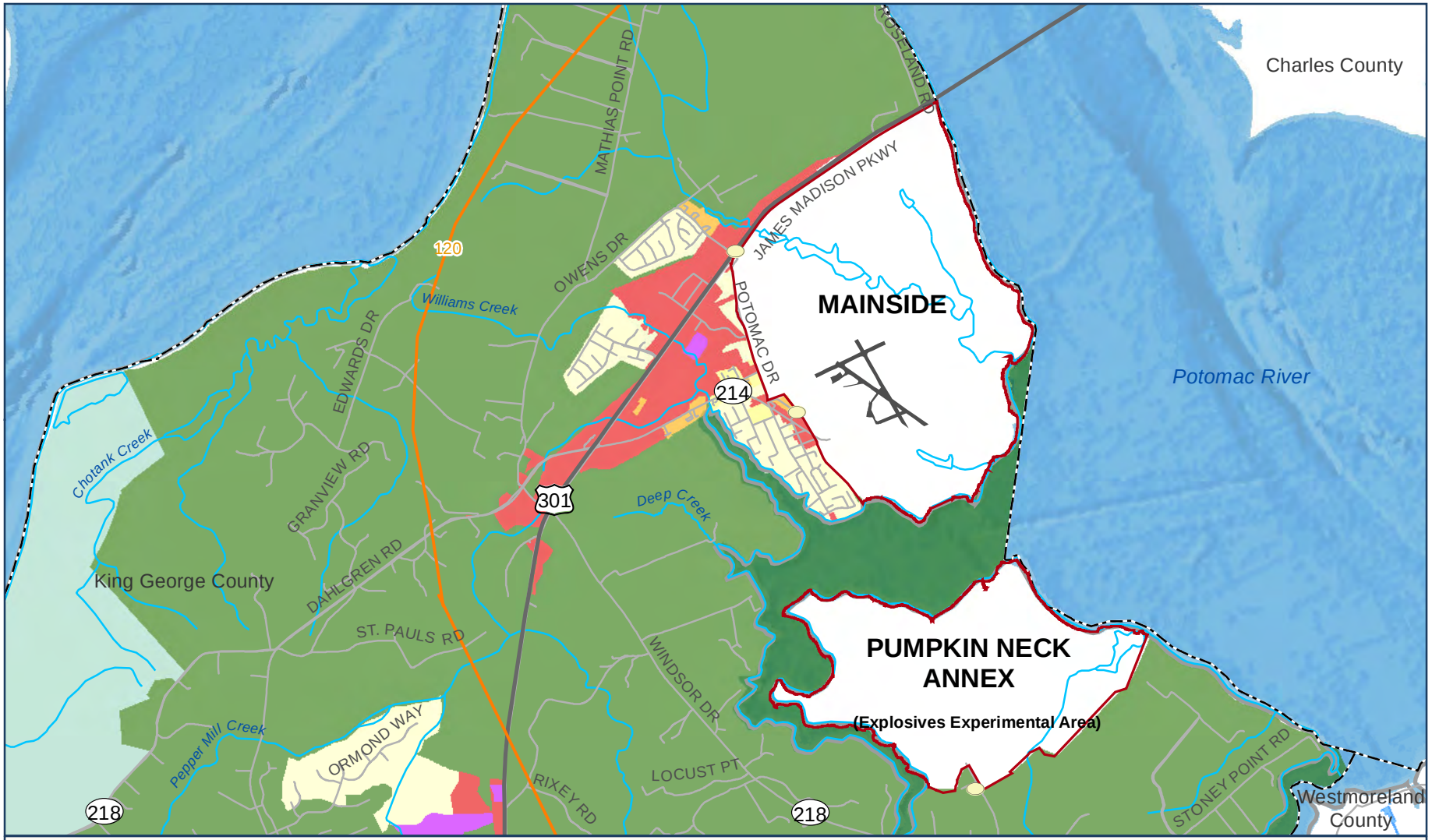
Larger scale operations are conducted at the installation, such as surface ship combat systems and ship weapons systems and firing capabilities. Force-level warfare systems are also conducted to simulate force-level, battle group-level, and theater-level scenarios. This type of operations helps the Navy to assess warfare systems requirements, warfare systems engineering, and mission assurance.

Chapter 3, Plan for the Future, of King George County's Comprehensive Plan identifies the Dahlgren PSA as an area that best supports future growth to implement the county growth vision. The Plan encourages mixed use (residential and office uses), commercial, and industrial development within the Dahlgren PSA.

The Dahlgren PSA was specifically chosen as a growth area due to its concentration of existing development, containing 12 percent of the county's population. Additionally, the area contains the largest office park, largest commercial development concentration, and the largest employment center – NSF Dahlgren. Another attractive aspect of the area is the public water and wastewater service, which includes a recent upgrade to the wastewater treatment plant. With low lying topography in the area, there are very few physical constraints to development. The future recommended development involves a compact "Village District." The area is divided into three sub-planning areas cores: Main Street, Commercial, and Residential. Key policies include the possibility of rezoning to create mixed use zoning districts and increased residential density. The goal of the district is to use land more efficiently and be designed for the human scale. Uses within the Dahlgren PSA are identified by zoning district. Figure 5-9.1 illustrates the zoning associated with the Dahlgren PSA per the Comprehensive Plan, and the extent of the 120 dB peak noise contour – one defined compatibility factor affecting this PSA. Other factors such as safety and vertical obstructions are potential compatibility factors if a fixed wing air mission is reestablished at NSF Dahlgren in the future. A discussion of noise and safety compatibility is provided under the respective factors in this chapter.

Mission operations may be compromised by a growing population that restricts the efficiency and efficacy of testing areas, while potentially causing community concerns of noise and safety. While increasing growth adjacent to NSF Dahlgren is an efficient way to develop land around the installation, proper guidelines must be used to ensure the quality of life in surrounding communities.

Source: King George County Comprehensive Plan, 2013.



Source: Dahlgren NSF, 2013

Fig5-9-1_NSF_Dahlgren_GrowthMIA_20141118_CJM.pdf

Figure 5.9-1: Growth in Military Influence Areas

Issue LU-3	**Potential Incompatible Development Along the Potomac River Test Range and Near the Range Stations.** Development pressure along the waterfront is increasing and may impact the use of range stations and range operations along the test range. Several of the range station locations are leased from private individuals. The use of these range stations may be lost as development occurs or property ownership changes.

NSF Dahlgren has two active range complexes, the Explosives Experimental Area and the PRTR. The PRTR is an over-the-water range that covers 51 miles of the Potomac River. Range stations are located along the shoreline which collect information and are necessary for safe operations. These stations are situated on leased private and federal property in the Town of Colonial Beach and Westmoreland and Charles counties, making them vulnerable to increasing land values and neighboring development. Although land surrounding the station is primarily agricultural and rural (for the exception of Colonial Beach stations), there has been a recent increase in population growth, which is expected to continue.

Development within Charles County, located north of the PRTR, is less of a concern since developed areas are predominantly in the north and northwest portions of the county and away from the shoreline. However, the county has considered extending public services to waterfront communities such as Cobb Island – a tourism-based community with a population of 1,166 per the 2010 US Census. An increase in growth and development on the island resulting from additional infrastructure would expose increased numbers of residents to noise impacts from testing operations in the PRTR.

Source: Charles County Comprehensive Plan, 2013

Existing Tools

Naval Support Facility Dahlgren Master Plan

The NSF Dahlgren Master Plan addresses the installation's explosive constraints, including the encroachment pressure on the PRTR. Outreach measures are used to familiarize new residents with PRTR operations. The plan recommends that representatives take advantage of opportunities to participate in planning efforts to make sure that the PRTR is included in initiatives and remains viable.

Readiness and Environmental Protection Integration

To prevent incompatible development and protect NSF Dahlgren's RDT&E activities, the Navy is working with a number of partners to preserve land on both banks of the Potomac River and up to several miles inland. The Navy will acquire restrictive easements to remove the development rights on agricultural and forested lands. Much of the land targeted for protection is already adjacent to public lands that cannot be developed. Protecting these private lands helps secure these mission activities, reducing potential complaints related to noise and vibration. Additionally, this project advances stream protection initiatives and supports goals for preserving habitat and species throughout the Chesapeake Bay ecosystem.

Naval Support Facility Dahlgren Integrated Natural Resources Management Plan

The NSF Dahlgren Integrated Natural Resource Management Plan (INRMP) provides as a comprehensive plan, establishing framework that allows the installation to carry out necessary missions while promote ecosystem health and maximize biodiversity at the installation and in the surrounding region.

Legislative Initiatives

Legislative initiatives are proposed changes in relevant policies, laws, regulations or programs which could potentially have a significant impact on one or more substantive areas of concern to both the facility and to the stakeholder communities. The focus of this compatibility issue is on initiatives with general and broad implications.

Issue LEG-1	**Lack of Virginia Requirement for Real Estate Disclosure to Identify Proximity to Dahlgren.** The Virginia Residential Property Disclosure Act requires disclosure of a property's location only if within a Noise Zone or Accident Potential Zone for military air installations and only for properties located within the same jurisdiction as the military air installation. Disclosure requirements do not address other potential nuisances such as frequency interference. The use of real estate disclosures is subject to the realtor's discretion on providing notification to prospective buyers.

Compatibility Assessment

Before a transfer of real property, real estate disclosures require sellers and their respective agents to disclose certain facts relevant to the condition of the property including proximity or other nuisance impacts associated with property situated near a military installation or operations area.

The purpose of this disclosure is to protect all involved parties from potential litigation resulting from existing and/or anticipated conditions (i.e., noise, safety hazard areas, and existing easements). Disclosures act as an essential compatibility tool because they keep buyers aware of the potential effects from nearby military installations. Most military-oriented disclosures identify the location of the installation and provide resources to find out more about the installation in order to mitigate potential issues.

The Virginia Residential Property Disclosure Act only requires the disclosure of a property's location within a Noise Zone or Accident Potential Zone for conflicts with military air operations. While there is minimal air operations at NSF Dahlgren, the extensive munitions testing and electromagnetic operations are a relevant point of interest to nearby homeowners. While the use of real estate disclosures is currently left to the discretion of the realtor, improving the accountability to notify prospective homebuyers of the installation's proximity could increase awareness and moderate concern. Additionally, disclosure requirements do not address other potential nuisances such as frequency interference.

Source: Code of Virginia

Existing Tools

Virginia Residential Property Disclosure Act

Disclosures are currently required in Virginia for both the sale and rental of property that is potentially impacted by noise or safety concerns from a military installation. The Virginia Residential Property Disclosure Act, (Title 55, Chapter 27 of the Code of Virginia) governs the information owners must provide to prospective purchasers of real property. Section 55-519.1 specifically details required disclosures for residences proximate to a military air installation. This section of the code states:

> *The owner of residential real property located in any locality in which a military air installation is located shall disclose to the purchaser whether the subject parcel is located in a noise zone or accident potential zone, or both, if so designated on the official zoning map by the locality in which the property is located on a form provided by the Real Estate Board. Such disclosure shall state the specific noise zone or accident potential zone, or both, in which the property is located according to the zoning map.*

While this is a good tool for providing disclosure for property within the noise zones at NSF Dahlgren, the disclosure does not apply to property located within NSF Dahlgren accident potential zones, since they currently do not exist. The Property Disclosure Act also does not require disclosure for other potential issues that may arise from being proximate to an installation, such as frequency interference. Additionally, the Property Disclosure Act only requires that an owner of property located in the same locality where the military installation is (King George County) must provide disclosure to potential purchasers.

This may be of concern due to the fact that Westmoreland County and the Town of Colonial Beach are within the installations noise zones.

Source: Virginia Residential Property Disclosure Act, Code of Virginia.

Findings

- The Virginia Residential Property Disclosure Act is a good model for real estate disclosure in jurisdictions that have a military installation, but does not fully encompass all affected areas of an installation's noise zones or Accident Potential Zones (APZs), which may be located in other jurisdictions.
- The 3000 foot rule provided in Title 15.2 is a good installation measurement for affected areas proximate to a military installation, but should be increased and incorporated into the VA Property Disclosure Act. 3-5 miles would encompass areas affected by the installation noise zones and APZs in that jurisdiction, as well as areas in other jurisdictions that are also affected by the installations operations, noise zones and APZs.
- Code of Virginia disclosures does not mention proximity to PRTR.
- Option of disclosure should not be left at the discretion of the realtor.

Issue LEG-2	**Maryland Real Estate Disclosure Does Not Specify Military Installation or Potential Nuisances.** Maryland's Real Property Annotated Code requires real estate agent to inform a prospective homebuyer that their property "may be located near a military installation that conducts flight operations, munitions testing, or military operations that may result in high noise levels." Identifying a property's proximity to a military installation, the name of the installation, and potential nuisances that may result are not required in the disclosure.

Maryland's Real Property Annotated Code only requires disclosure for properties that "may be located near a military installation that conducts flight operations, munitions testing, or military operations that may result in high noise levels." While this legislature is more accountable than that of Virginia's, it fails to include several key factors relevant to NSF Dahlgren. For example, the code fails to require the identification of the installation's name, proximity and potential nuisances.

This lack of inclusion may decrease potential compatibility between the installation and nearby residential uses. Disclosing the impact of NSF Dahlgren to homebuyers could promote a stronger relationship between the installation and the community. Prospective homebuyers who are aware of the installation's locale and operations are less likely to generate complaints due to prior knowledge of noise levels.

Source: Maryland Annotated Code.

Existing Tools

Maryland Real Property Article of the Annotated Code

Section 14-117(k) of the Real Property Article of the Annotated Code of Maryland provides that a contract for the sale of residential real property shall contain the following statement, if the property is subject to high noise levels from proximity to a military installation:

Buyer is advised that the property may be located near a military installation that conducts flight operations, munitions testing, or military operations that may result in high noise levels.

Whether or not there is such a military installation anywhere near the property has no bearing on the requirement to give the notice, due to potential noise levels that may result from range operations not nearby the installation itself. While this is a good model for real estate disclosure for property proximate to a military installation, the statement does not require the property's recorded distance from the installation or other potential nuisances which may occur, such as lighting, frequency interference or associated land use impacts.

Source: Maryland Annotated Code, Real Property Article; Section 14.

Maryland Association of Realtors Standard Contract of Sale

Pursuant to the section of the Maryland Annotated Code on Real Property, the Maryland Association of Realtors form for Residential Contract of Sale identifies disclosing the same statement as found in the Annotated Code for residences proximate to military installations.

Additionally, the Southern Maryland Association of Realtors developed an addendum in 2008 to the standard state Residential Contract of Sale to incorporate the following disclosure provisions relative to NSF Dahlgren and other military installations in Southern Maryland:

- **12. Military Aircraft Operations.** The property may be located within or near several military aircraft operation centers located in Calvert County, Charles County, Prince George's County or St. Mary's County. Properties located within or near such military aircraft operation centers may be impacted by varying degrees of noise levels and potential military aircraft accidents as well as noise from gunfire or explosive testing. The following is a description of such military aircraft operation centers; however the following list is not all inclusive:

  (B) NSF Dahlgren typically conducts flight operations five days per week, between 8 a.m. and 4 p.m. However, infrequent flight operations occur outside these times. The present level and type of operations will continue for the foreseeable future. For additional information, contact the Naval Surface Warfare Center, Dahlgren Division, and Public Affairs Office.

- Buyer acknowledges that Buyer, prior to the submission of a written offer to purchase the property, is solely responsible to contact the military aircraft operation centers, as identified above, which may impact upon the property in order to ascertain the potential noise levels and accident probabilities in relation to the location of the property within or near one or more of the above military aircraft operation centers.

The addendum to the State Contract of Sale also identifies disclosure statements for NAS PAX, NSF Indian Head, and Andrews Air Force Installation, although due to their distances from NSF Dahlgren, they are not included in the analysis of this issue.

Although the standard state Residential Contract of Sale disclosure does not apply in Allegany, Carroll, Frederick, Garrett, Howard, Montgomery and Washington Counties, there still may be some impact on residential properties located in these communities. So while these forms follow state legislative requirements, and are a good tool for compatibility in regards to real estate disclosure, they do not include any mention of identifying specific distances from these installations which may pose a concern for affected properties nearby.

Source: MAR standard Contract of Sale; SMAR 2008 Addendum.

Findings

- The Maryland Real Property Annotated Code is a good compatibility tool that mandates real estate disclosure for properties that may be located near a military installation.

- The Maryland Association of Realtors standard state Contract of Sale form is also a good compatibility tool in that it mandates the same disclosure statement as provided in the Annotated Code.
- The Southern Maryland Association of Realtors addendum to the state Contract of Sale form is a great tool which focuses in on precise issues and operations associated with specific military installations- it actually mentions NSF Dahlgren flight times, presence of loud noises, and contact information for additional information.
- The standard state Contract of Sale, as well as the Real Property Section of the Maryland Annotated Code do not mention a specific distance at which a property is considered "proximate" (such as one mile radius from the installation) or other potential issues of concern. This may be an issue due to the fact that it can debated as to what actually constitutes proximity to an installation, or what an issue of concern is.
- The state Contract of Sale, as well as the Real Property Section of the Maryland Annotated Code do not mention flight operations or proximity to the Potomac River Test Range and its activities, which is where weapons firing and other operations take place.

Issue LEG-3	**Frequency Spectrum Use is Not Regulated on the Consumer Level.** Part 15 devices are regulated by the Federal Communication Commission; however, not all equipment that uses Radio Frequency energy is required to have a license or assignment. Additionally, Real estate disclosures do not address frequency spectrum.

Frequency spectrum is the entire range of electromagnetic frequencies used for communications and other transmissions, which includes communication channels for radio, cellular phones, and television. In the performance of typical operations, the military relies on a range of frequencies for communications and support systems. Similarly, public and private users rely on a range of frequencies in the use of cellular telephones and other wireless devices such as garage door openers on a daily basis. Part 15 of the Code of Federal Regulations includes the rules and technical specifications for non-federal use of unlicensed radio frequency devices such as ham radios.

Part 15 devices are regulated by the Federal Communication Commission (FCC) for not exceeding limits for spectrum emissions at the point of manufacture, however once these devices are purchased by a consumer it is the consumers' responsibility to ensure devices do not frequency interference. With an increasing civilian use of Part 15 devices and an expanding need for military use of frequency spectrum for testing, evaluation and training, the regulation of such uses is becoming a growing area of interest.

Part 15 device use is neither regulated on the consumer level, nor addressed in real estate disclosures. This lack of oversight may lead to interference between military and civilian radio use and adverse impacts from civilian or military spectrum interference.

Additionally, no disclosure exists between military use of frequencies and civilian use of frequencies within areas proximate to the installation. There is no coordination between the military and surrounding communities for sharing bandwidth. Property disclosures pertaining to potential spectrum interference would allow for additional coordination between NSF Dahlgren and the surrounding communities regarding Part 15 device usage.

Source: CFR Part 15.

Existing Tools

Code of Virginia

Code of Virginia Title 15.2 details several regulations for counties, cities, and towns in regards to land planning in proximity to a military installation. While specifically tailored to local jurisdictions, the statutory framework does currently exist in Commonwealth law that requires notification from

the jurisdictions to the installation of development in the area that may impact the installation and / or operations.

While this regulation may not mandate private real estate disclosure from a seller to a buyer, it still requires notification from local jurisdictions to the installation in regards to development that may impact the installation. This could be a helpful tool for deducing if any future development would provoke a potential frequency spectrum interference issue.

Source: Code of Virginia, Title 15.2, Sections 2200-2211.

Virginia Residential Property Disclosure Act

Virginia currently requires disclosures for both the sale and rental of property that is potentially impacted by noise or safety concerns from a military installation. The Virginia Residential Property Disclosure Act, (Title 55, Chapter 27 of the Code of Virginia) governs the information owners must provide to prospective purchasers of real property. This section does not include any mention of potential spectrum interference.

While this is a good tool for providing disclosure for property within the noise zones at NSF Dahlgren, the Act does not require disclosure for other potential issues that may arise from locations proximate to an installation, such as frequency interference. Additionally, the Property Disclosure Act only requires that an owner of property located in the same locality where the military installation is (King George County) must provide disclosure to potential purchasers. This may be of concern due to the fact that the Town of Colonial Beach and Westmoreland County may be affected by spectrum interference.

Source: Virginia Residential Property Disclosure Act, Code of Virginia.

Maryland Real Property Article of the Annotated Code

The Real Property Article of the Annotated Code of Maryland, Section 14-117(k), provides that a contract for the sale of residential real property shall contain a statement, if the property is subject to high noise levels from proximity to a military installation. The contract does not require any statements in reference to potential frequency interference. Whether or not there is such a military installation anywhere near the property has no bearing on the requirement to give the notice due to potential spectrum interference that may result from range operations along the PRTR. Additionally, the statement does not require the property's recorded distance from the installation or other potential nuisances which may occur, such as frequency interference or land use impacts.

Source: Maryland Annotated Code, Real Property Article; Section 14.

Maryland Association of Realtors Standard Contract of Sale

The Maryland Association of Realtors form for Residential Contract of Sale identifies disclosing the same statement as found in the Annotated Code for residences proximate to military installations.

In 2008, the Southern Maryland Association of Realtors developed an addendum to the standard state Residential Contract of Sale to incorporate disclosure provisions relative to NSF Dahlgren and other military installations in Southern Maryland. The addendum to the State Contract of Sale also identifies disclosure statements for NAS PAX, NSF Indian Head, and Andrews Air Force Installation, although they only discuss flight operations and potential noise nuisances and there is no mention of frequency spectrum interference in any of these statements. This could pose an issue, due to the fact that frequency interference could happen in nearby communities, at lengths that exceed the installation and its ranges.

Source: MAR standard Contract of Sale; SMAR 2008 Addendum.

Code of Federal Regulations, Title 47, Part 15

The rules and technical specifications that apply to non-federal use of unlicensed devices are in Title 47 of the Code of Federal Regulations Part 15 (47 CFR 15). There are many parts to Title 47, each regulating a different type of radio operation. For example, Part 11 regulates the Emergency Alert System, and Part 97 covers the Amateur Radio Service. Part 15 regulates radio frequency devices and contains language specifically regulating the operation of unlicensed devices.

Source: CFR, Title 47, Part 15.

Federal Communications Commission Public Notice DA 05-424

In February 2005, the FCC issued Public Notice DA 05-424, stating that garage door opener manufacturers offered to assist consumers in the resolution of frequency interference to devices including making available for consumer purchase a replacement transmitter and receiver to operate on a different frequency than that used by government or military services and mobile radio systems. This was in response to communication and discussions between garage door manufacturers and the DOD to help reduce the impacts of frequency issues between military and civilian uses.

Source: https://apps.fcc.gov/edocs_public/attachmatch/DA-05-424A1.pdf

Federal Strategic Spectrum Plan

The US Department of Commerce released the Federal Strategic Spectrum Plan in March 2008, which was conducted by the NTIA in consultation from the FCC. This plan was developed in response to the Presidential Spectrum Policy Initiative established in 2003, which seeks to ensure that appropriate frequency spectrum is available and properly utilized by various government entities. The plan provides a comprehensive description of the current use and future needs of 15 Federal agencies, which all submitted their frequency use plans regarding the frequency spectrum. The plan encourages the collaboration of Federal and civilian communities to work together to ensure that use of frequency spectrum is appropriately shared and one entity does not impact another's usage. Coordination among these various agencies and the Federal Strategic Spectrum Plan should be able to properly manage any additional frequency bandwidth requirements between military needs and civilian activities.

Source: http://www.ntia.doc.gov/files/ntia/publications/federalstrategicspectrumplan2008.pdf

Findings

- None of the tools describe potential for Frequency Spectrum Interference in disclosures.
- The Virginia Residential Property Disclosure Act is a good model for real estate disclosure in jurisdictions that have a military installation, but does not fully encompass all affected areas of an installation due to potential for Frequency Spectrum Interference which may occur in other jurisdictions.
- The standard state Contract of Sale, as well as the Real Property Section of the Maryland Annotated Code, do not mention other potential issues of concern such as frequency interference. This may be an issue due to the fact that it can debated as to where issues of concerns are, such as Frequency Spectrum Interference which may occur within the PRTR.
- The federal strategic spectrum plan is a good federal tool for dealing with frequency spectrum issues, although it is unclear whether or not it will have any effect on the use or regulation of Part 15 devices.

Light and Glare

This factor refers to man-made lighting (street lights, airfield lighting, building lights) and glare (direct or reflected light) that disrupts vision. Light sources from commercial, industrial, recreational, and residential uses at night can cause excessive glare and illumination impacting the use of military night vision devices and air operations. Conversely, high intensity light sources generated from a military area (such as ramp lighting) may have a negative impact on the adjacent community.

Technical Background

Technology evolution and innovation has made it possible for warfare to excel at night. Night vision devices and other special tactical procedures are deployed to enable strategic nighttime warfare. Thus, nighttime warfare enables the military to execute a multi-faceted offensive strategy

under the cover of darkness. To be successful in combat, the military must train under conditions and environments similar to what is found in combat theaters. Night vision devices allow military personnel to train in near-daylight conditions during nighttime hours.

Under dark sky conditions, the use of night vision goggles (NVG) allows military personnel to view objects up to a distance of nearly 1,000 feet (300 meters); however, light sources located outside of an installation can decrease the NVG effectiveness to a distance of more than 150 feet (50 meters). Lighting located outside of an installation can decrease NVG effectiveness to a distance of 164 feet (50 meters). Street lights or other elevated structures that are lit at night produce a halo effect around objects, which reduces visibility and resolution for air and ground personnel. The amount of ambient light experienced on the ground is a function of the following:

- intensity of nearby light sources (up to 20 miles away);
- distance from the sources;
- spectra of the light sources (blue light decays faster in the atmosphere);
- density of the cloud deck;
- height of the cloud; and
- relative humidity.

In measuring light pollution, the proximity to a community has a significant effect on the amount of light pollution that saturates the sky. Proximity twice as close to a community makes its sky glow appear approximately six times brighter.

Sky glow from communities typically diminishes in the later hours of the night when businesses close and some lights are turned off. As development continues to progress outward from a community, the area and amount of light pollution can increase. Increased light pollution can cause an increase in the amount of sky glow and ultimately create compatibility issues with military missions.

The impacts of the use of outdoor lighting on the dark skies over military installations are primarily determined by two principal factors – the amount of developed land (density) and the distance of the developed land from the installation. The relationship between density and distance is best demonstrated using an estimate of urban sky glow called Walker's Law.

This formula was developed on measurements of sky glow for a number of cities in California and used to estimate sky glow at an observing site looking at a zenith angle of 45 degrees toward an urban source:

$$I=C \times P \times R(n)$$

Where:

I = Percent increase of the night sky brightness above the natural background, at 45°down from directly overhead (facing the community, directly overhead is roughly ¼ of this value),

P = Population of the community,

R = Distance, in kilometers, from the observing site to the center of the community,

"C" = 0.01 for "R" values between 10 and 50 km, and

"n" = 2.5 for "R" values between 10 and 50 km

According to the National Oceanic and Atmospheric Administration (NOAA), the assumed radius of a community is a function of its population, ranging from 2.5 km to 24 km. Walker's law applies if the installation is outside the city radius. If located inside the community radius, the sky glow increases in a linear manner toward the center by an additional factor of 2.5.

The following scenarios illustrate the application of Walker's Law:

Scenario 1: A 100-acre development located two km from the installation with a density of six units per acre (assuming 2.5 persons per household) would impact the sky background by over 260 percent (nearly 663 percent with NOAA factor).

Scenario 2: A 100-acre development located 20 kilometers from the installation with a density of six units per acre (assuming 2.5 persons per household) would impact the sky background by approximately less than 1 percent (just over two percent with NOAA factor).

If the density was decreased to one unit per acre the resulting scenarios would result in the following increased sky glow:

Scenario 1: Approximately 44 percent (almost 111 percent with NOAA factor).

Scenario 2: Approximately less than 1 percent (still less than one percent with NOAA factor).

In general, the following trends can be concluded:

The more dense the urban development, the greater the potential for light intrusion.

The closer development is to the installation, the greater the potential for light intrusion.

Source: National Oceanic and Atmospheric Administration

Compatibility Assessment

Issue LG-1	**Lighting Levels Along Waterfront Could Impact Dahlgren's Ability to Perform Night Testing.** The utilization of the Potomac River Test Range at night with use of night vision devices is constrained by both existing light sources along the waterfront and the potential for increased sky glow as waterfront areas develop. There are no ordinances in place that regulate the type, size, or intensity of lighting at night. Certain types of directional lighting can produce ambient light and light trespass rendering the night vision training devices ineffective.

The mission of NSF Dahlgren is to support RDT&E activities conducted by its tenant commands to ensure that equipment works successfully under all conditions. A large part of the testing takes place at two active range complexes, the Explosives Experimental Area and the PRTR. Activities within the PRTR employ EM energy, lasers, and chemical and biological simulants. These activities were typically scheduled Monday through Friday between 8 am to 5 pm. There has been a growing need to test these tools in nighttime conditions to match realistic operational requirements, including a proposed expansion in outdoor RDT&E activities. In July 2013, a Record of Decision was rendered to increase use of the PRTR by 130 hours annually including expanding testing during nighttime.

Increased growth around NSF Dahlgren is anticipated along the Potomac River, which will bring unwanted light to the testing area. Zoning Ordinances in King George County and Westmoreland County do not specify restrictions on light along the river.

Charles County development is predominantly located north of the PRTR and is less of a concern since areas of dense development are located mostly in the north and northwest portions of the county away from the waterfront.

Existing Tools

Environmental Impact Statement for Outdoor Research, Development, Test & Evaluation Activities, Naval Surface Warfare Center, Dahlgren Division

Under the Proposed Action of the EIS, some of the tests using EM energy, lasers and sensors would take place in less than ideal conditions, such as in adverse weather and at dusk, dawn, and night, which are not currently conducted. Alternative 2 which accommodates the largest amount of growth was chosen, and a 33 percent increase in PRTR hours of use above then recent levels was incorporated. This increase satisfies both baseline requirements, as well as a margin of growth for the most quickly evolving programs. The EIS also approves expanding testing during night time, although it is not frequent. Mentions of night time training / operations in the EIS include:

- Occasionally, ordnance subjected to slow cook-off tests on the EEA may detonate at night or on weekends,
- HE Laser activities are rarely conducted at night,
- NSWCDD may need to use the airspace outside the normal hours (i.e., at night or on weekends),
- Firing normally takes place between the hours of 8 am and 5 pm daily except Saturdays, Sundays, and national holidays, with infrequent night firing between 4 pm and 10:30 pm.

The EIS also states that the Range Operations Center (ROC) at NSWCDD notifies the public in advance of range activities including range schedules, types of tests, use of substances such as smoke or lights and whether noise will be made or not.

Source: NSWCDD Outdoor RDT&E activities EIS, 2013.

King George County Zoning Ordinance

The King George County Zoning Ordinance contains limited regulations pertaining to lighting. Prohibited lighting includes signs with exposed tubing or strings of light, blinking, fluctuating or moving light, and colored light. Required lighting includes parking lot lights, manufactured home park lights, and outdoor theaters, which are all to be shielded from adjoining properties or streets, with no mention of proximity to NSF Dahlgren or the Chesapeake Bay. Although there is a Chesapeake Bay Preservation Area Overlay District as part of the Zoning Ordinance, there are no lighting regulations as part of the Overlay District.

Source: King George County Zoning Ordinance, 2008.

Town of Colonial Beach Zoning Ordinance

The Zoning Ordinance for the Town of Colonial Beach includes a zoning ordinance with limited regulations for outdoor lighting, most of which is geared at lighting for signage and on residential streets. One such regulation is for the Maritime Commercial district, which is primarily situated along the coastal areas of the town. The regulation states that outdoor lighting shall not exceed 0.5 foot-candles at any property line and such lights shall be shielded to reflect the light down. Additionally, the regulation states that the light source shall be shielded so as not to be visible from adjoining property lines or public right-of-way and that lighting poles shall not exceed 15-feet in height. These requirements may help keep glare and light trespass along residential streets and in subdivisions to a minimum, although they do not particularly address areas along the Potomac River.

Source: Colonial Beach Zoning Ordinance, 2012.

Charles County Zoning Ordinance

Charles County Zoning Ordinance has several regulations pertaining to outdoor lighting, which is important due to the county's proximity to the PRTR on the other side of the Potomac River. For streetlights in most zoning districts, pedestrian-scaled, County-approved street lighting fixtures are required to be installed on both sides of all streets at no more than 60-foot intervals measured parallel to the street. For signage, external lighting fixtures used to illuminate signs are required to provide full cut-off fixtures to reduce sky glow and glare. For parking lots, no lights shall be more than 10 feet above ground level, and no outdoor lighting shall shine into residential windows or onto adjoining residential properties.

For outdoor lighting, the ordinance requests lighting fixtures be located, shielded, landscaped or otherwise buffered so that no direct light shall intrude into any adjacent residential area. Furthermore, lighting shall be low-level for certain uses and arranged as not to reflect or cause glare into residential zones. Section 297-306 of the Zoning Ordinance gives lighting standards to be adhered to for Site Design. This section details permitted heights of lighting, and cutoff regulations. While these are all helpful standards for residential areas, they do not properly address lighting along the coastal areas of the County that may impact military mission operations in the PRTR.

Source: Charles County Zoning Ordinance, 2013.

Westmoreland County Zoning Ordinance

The Westmoreland County Zoning Ordinance has installation lighting requirements directed at all districts. The installation requirement states that no direct or sky-reflected glare, whether from floodlights or from high-temperature processes, such as combustion, welding or otherwise, shall be permitted to be visible beyond a lot line, except for signs, parking lot lighting and other lighting permitted by the ordinance by other applicable regulations. It furthermore states that all lighting shall be diffused, down-cast or hooded so as not to spread to adjacent properties. Sign lighting in particular is restricted to business operating hours. Additionally, spot-lighting and light intensity is limited. Again, while these regulations address residential area lighting, they do not separately address lighting along the shoreline or have any special provisions for lighting at night time.

Source: Westmoreland County Zoning Ordinance, 2011.

St. Mary's County Comprehensive Zoning Ordinance

Similar to the other zoning ordinances described, St. Mary's County also provides regulations for outdoor lighting. For public safety facilities, religious assemblies, parking lots, and most other uses, lighting is to be directed downward and shall not shine directly onto an adjacent property. For specific uses that may create excess light, such as recreational facilities, maximum heights of lighting poles are given which range anywhere from 45 to 70 feet in height. Lighting from these poles shall be directed internally as to not extend or project light past a 30-foot buffer area. Other lighting regulations for recreational facilities and similar uses state that aside from minimal security lighting, exterior lighting shall be extinguished outside of hours of operation.

Section 61.3 details lighting standards for general development. This section gives maximum on site lighting levels and further design standards such as equipping fixtures with shields. One of the standards states that lighting systems should include timing devices to turn off unneeded lighting during time the project is not in use. This would apply to development happening along the shoreline which may have lighting at night.

Source: St. Mary's County Zoning Ordinance, 2013.

King George County Comprehensive Plan

Several future land use policies provided in the King George County Comprehensive Plan identify outdoor lighting goals which may have impact on NSF Dahlgren and its operations within the PRTR. These goals include:

- Promote lighting design which minimizes light pollution, enhances the environment, deters undesirable activities, increases safety, and minimizes glare, power consumption, cost, visual impacts (day and night), and unwanted truant light onto private property.
- Protect the dark sky of King George County as one of our many natural, scenic, scientific and cultural resources, for the benefit of residents, and visitors, now and in the future.

While these goals may have minimal effect on outdoor lighting along the waterfront, they are good strategies for minimizing glare and mitigating sky glow at night. The goal may also prompt lighting standards and design regulations for commercial and / or industrial lighting in areas that may adversely impact operations at NSF Dahlgren or along the PRTR.

Source: King George County Comprehensive Plan, 2013.

Findings

- The EIS for Outdoor Activities details that the NSWCDD Range Operations Center (ROC) notifies the public in advance of range activities including range schedules, types of tests, use of substances such as smoke or lights and whether noise will be made or not. This would include training at night and would help with interagency coordination efforts.
- Recommendations given in the EAP that deal with opposition to up-zoning and increase minimum lot sizes may indirectly support night time training operations. Lower densities and larger lots along the shoreline would assist in decreasing potential light trespass or glare during night time operations conducted in the PRTR.
- While all zoning ordinances have some sort of lighting regulation dealing with light trespass on adjacent residential properties, none of the regulations deal with light trespass from shoreline properties.
- The zoning ordinances that have lighting regulations do not address any night time lighting regulations that would affect potential night time operations conducted by NSWCDD in the PRTR areas.
- The lighting regulations in the zoning ordinances do address glare caused by lighting fixtures, stating they need to be facing downward and shielded as to not allow light trespass on adjacent properties. There are also some regulations that restrict light poles to certain heights. However, none of these regulations address lighting along shoreline areas or at specific hours of the day (such as after business hours). Only St. Mary's County ordinance recommends having a timing device to turn off unneeded lights during hours or non-use.

Noise

Technical Background

Sound is defined as the mechanical energy transmitted by pressure waves in a compressible medium such as air. More simply stated, sound is what we hear. As sounds reach unwanted levels, this is referred to as noise.

The central issue of **noise** is the impact, or perceived impact, on people, animals (wild and domestic), and general land use compatibility. Exposure to high noise levels can have a negative impact on human activity, health, and safety.

Due to the technical nature of this compatibility factor and its importance to the JLUS process, this section provides a discussion of the characteristics of sound and the modeling process used to evaluate noise impacts. The following key terms are used to describe noise.

Ambient noise. The total noise associated with an existing environment, which usually comprises sounds from many sources, both near and far.

Attenuation. Reduction in the level of sound resulting from absorption by the surrounding topography, the atmosphere, distance from the source, barriers, construction techniques and materials, and other factors.

A-Weighted decibel (dBA). The dBA is the most commonly weighted sound filter used to measure perceived loudness versus actual sound intensity. The human ear responds differently to frequencies. For example, the human hearing system perceives mid-frequency sounds as louder than low and high frequency sounds. To accommodate this condition when measuring sound levels, filters need to be installed into sound meters. The results are a more accurate measurement of sound for the human hearing system.

Day-Night Average Sound Level (DNL). An average sound exposure over a 24-hour period. During the nighttime period (10:00 p.m. to 7:00 a.m.), averages are artificially increased by 10 decibel (dB). This weighting reflects

the added intrusiveness and the greater disturbance potential of nighttime noise events attributable to the fact that community background noise typically decreases by 10 dB at night.

Noise contours. Noise contours are made by connecting points of equal noise exposure to form an enclosed area in which sound level is generally the same. The Chief of Navy Operations Instruction (OPNAVINST) 11010.36C defines noise zones based on noise contours.

Noise-sensitive uses. Locations and uses typically more sensitive to noise, including residential areas, hospitals, convalescent homes, and facilities, schools, and other similar land uses.

Characteristics of Sound

It is important to understand that there is no single perfect way of measuring sound, due to variations used by different entities when conducting sound studies or sound modeling. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The dB scale is used to quantify sound intensity. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic loudness scale (i.e., dB scale) is used to present sound intensity levels in a convenient format.

Since the human ear is not equally sensitive to all frequencies within the entire spectrum, noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process called "A-weighting" written as dBA. dBA are units of sound pressure adjusted to the range of human hearing with intensity greater than the ambient or background sound pressure. The threshold of human hearing is approximately zero dBA and normal speech has a sound level of approximately 60 dBA. Sound levels above 120 dBA are typically when discomfort begins to be felt inside the human ear, and sound levels between 130 to 140 dBA and above are felt as pain and may cause permanent damage to the ear.

The human ear can detect changes in sound levels of approximately three dBA under normal conditions. Changes of one to three dBA are typically noticeable under controlled conditions, while changes of less than one dBA are only discernible under controlled, extremely quiet conditions. A change of five dBA is typically noticeable to the general public in an outdoor environment. Figure 5-12.1 summarizes typical A-weighted sound levels for a range of indoor and outdoor activities.

Environmental noise fluctuates over time. While some noise fluctuations are minor, others can be more substantial. These fluctuations include regular and random patterns, how fast the noise fluctuates, and the amount of variation. Weather patterns can have a strong effect on how far sound travels and how loud it is. Certain weather events can change the consistency of the air and either cause sound to travel further and be louder or can reduce the distance at which it can be heard. Temperature and wind velocity are examples of factors that can affect sound travel. Sound tends to travel further in cold temperatures. Specific combinations of temperature and wind direction can create atmospheric refraction, which is when atmospheric conditions bend and/or focus sound waves towards some areas and away from others. When describing noise impacts, it is common to look at the average noise over an average day.

According to the DOD and the FAA, (Airport Noise Compatibility Planning [14 CFR Part 150]) 65 DNL is defined as the threshold for significant noise exposure. Noise exposure within the 55 to 65 DNL noise contours is regarded as moderate and land use controls such as the regulation of types of land uses permitted or the potential use of sound attenuation in buildings should be considered. Federal guidelines have been adopted to guide appropriate development and land use planning for noise contours greater than 65 DNL, and noise sensitive uses such as residential and schools should not be built under these areas without proper sound mitigation.

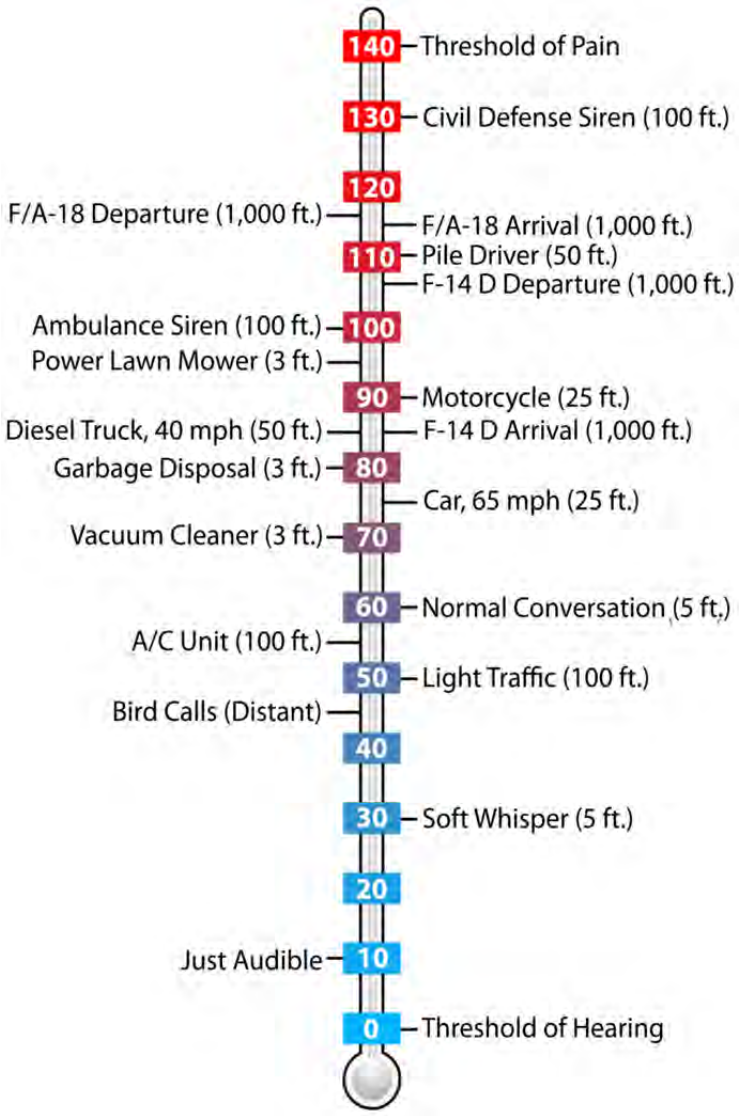


Figure 5-12.1 Sound Levels Comparison in dBA

It is important to recognize that noise contours as depicted on maps are intended as a planning tool and do not represent a clear change in noise threshold at each contour. Changes in noise levels may not be perceptible several hundred feet to either side of a particular contour line and can vary with temperature, humidity, wind, and other environmental factors. It should be noted that the DNL contours represent an average sound level over a 24-hour period and that individual instances may be louder than the noise contour in which they are located. Thus, noise may still cause an annoyance if it is below 65 DNL.

Compatibility Assessment

Issue NOI-1	**Range Noise Concerns and Complaints from Affected Sensitive Users.** Noise associated with range operations needs to be addressed as part of any future development proposals and approvals near the following areas: ■ Increased noise levels are experienced in locations that are identified as growth areas of Colonial Beach and Cobb Island. These areas are more populated and where the most noise complaints are received from. ■ Charles County has identified Swan Point as a future growth area in its Master Plan, which could exacerbate complaints from residents and confusion regarding source of noise due to other military installations in the region.

One of the concerns that nearby residents have with the operations at NSF Dahlgren is the noise caused by range operations. The noise-causing activities at the installation occur mostly on the PRTR and at the EEA. Noise tends to travel further and louder over water versus land, so firing down the river increases the distance of associated noise.

The noise zones for NSF Dahlgren, developed based on annual average noise doses (C-Weighted Day-Night Average Levels [CDNL]), identify areas where noise-sensitive land uses are not recommended. These contours

were modeled on the annual average of current activities and their associated noise – some events may generate noise louder than illustrated by the zones and outside the boundaries of zones since noise does not cease at a defined line and propagation is based on terrain, temperature, and environmental conditions.

Noise Zones

Noise Zone III consists of the area surrounding the PRTR experiencing 70+ dB CDNL caused by large-caliber weapons. The OPNAVINST 11010.36C recommends that no noise-sensitive uses are located in Noise Zone III. The majority of Noise Zone III is over water, and the portions of it that go over land are within the boundaries of NSF Dahlgren. Since there is no land outside of NSF Dahlgren located within Noise Zone III, it does not currently pose any major concern for neighboring communities.

Noise Zone II encompasses a broader region with a sound level between 62 and 70 dB CDNL. The OPNAVINST 11010.36C discourages noise-sensitive uses such as residential, hospitals, daycares and education facilities from locating within Noise Zone II, but if they must be located within this zone, they should incorporate noise level reducing materials in their construction. However, many traditional noise level reduction measures do not account for the low-frequency noise associated with heavy weapons firing that takes place at NSF Dahlgren. The majority of Noise Zone II is over water, but a small portion of it extends over land outside of NSF Dahlgren, approximately one mile to the south of the EEA and a few hundred feet west of Mainside. Due to the relatively high exposure to noise, land within Noise Zone II is recommended for industrial, manufacturing, transportation and production uses. A large amount of the land within Noise Zone II is currently undeveloped, but there is some single family residential uses within this zone. Small portions of the community of Dahlgren and the Town of Colonial Beach containing single family residential uses are within Noise Zone II.

Noise Zone I includes all areas surrounding a source with a day-night sound level lower than 62 dB CDNL. The Land Use Planning Zone (LUPZ) is the area between the 57-62 dB CDNL noise contours (between Noise Zones I and II). This noise level is less likely to impact noise-sensitive uses, but can still be considered a nuisance and have some impact on future development in the community. The LUPZ extends out further than Noise Zone II and extends over unincorporated King George County (including a portion of the community of Dahlgren), the majority of the Town of Colonial Beach and the community of Swan Point. Potomac Elementary School is located along the outer edge of the LUPZ in the community of Dahlgren. Table 5-12.1 identifies the communities that are located within the noise zones. Figure 5.12-2 illustrates the zoning districts within the 57, 62, and 70 dBA higher noise contours. This Figure also identifies whether the zoning districts are conditionally compatible because they include noise sensitive uses (but recommend sound attenuation in building construction to mitigate noise impacts) or incompatible because the noise sensitive uses are discouraged.

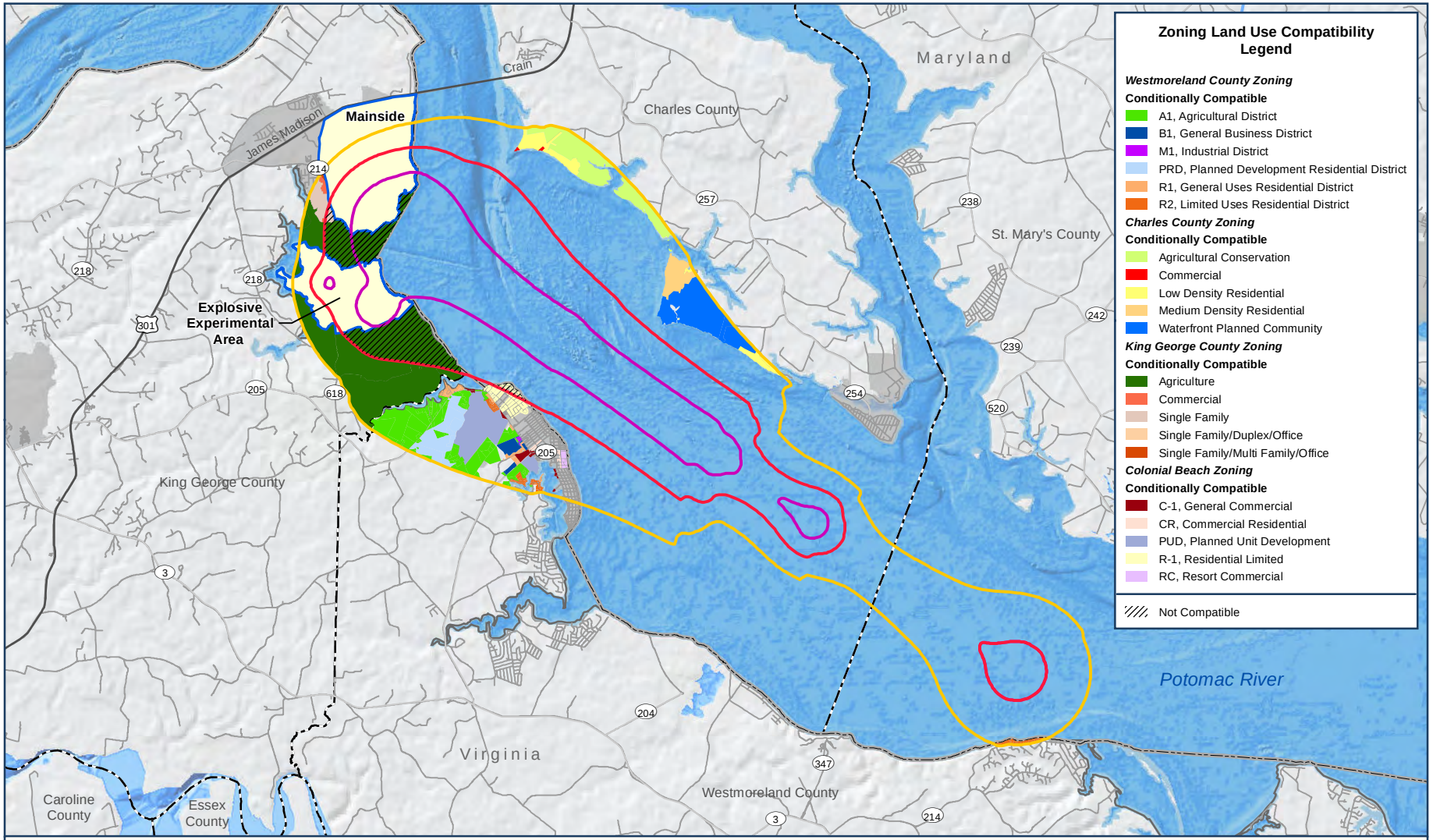
Table 5-12.1 Communities within the NSF Dahlgren Noise Zones

City/Census Designated Place	Noise Zone III (>70 dB)	Noise Zone II (62-70 dB)	Noise Zone I (<62 dB)	Land Use Planning Zone (57-62 dB)
Colonial Beach		X	X	X
Dahlgren			X	X
Swan Point			X	X

Source: Navy Operational Noise Consultation – Operational Noise Contours for NSF Dahlgren and NSF Indian Head, September 2009; Matrix Design Group

Noise Complaint Risk

A 2009 Navy Operational Noise Consultation identified methods to predict the risk of complaints due to noise from testing activities located at NSF Dahlgren. The area where a risk for complaints to occur is generally larger than the area identified for the noise zones. The noise zones are developed to determine areas where sound levels are average, but they do not account for events where the noise that occurs is louder or at a greater intensity than the average.



Source: Dahlgren NSF, 2013

Fig5-12-1_NSF_Dahlgren_ZoningRangeNoise_20141119_CJM.pdf

Figure 5.12-2: Zoning In Range Noise Zones

As identified in the 2009 noise consultation, complaint risks for weapons firing are broken down into three categories, as follows:

- The high risk of complaint area consists of the area around the source of the noise in which noise level is greater than 130 dB Peak for large caliber weapons.
- The moderate risk of complaint area consists of an area where the noise level is between 115 dB Peak and 130 dB Peak for large caliber weapons.
- The low risk of complaint area includes all areas around a noise source in which the noise level contour is less than 115 dB Peak for large caliber weapons.

As illustrated in Chapter 3, Figure 3-6, the moderate complaint risk area extends several miles around NSF Dahlgren and the PRTR over land where there is a lot of development including several communities on both sides of the Potomac River.

Noise complaints from communities located near NSF Dahlgren may be compounded by increased sound levels due to the effects of water causing propagation. The PRTR poses the greatest concern for neighboring communities because the noise traveling from the military activity on the range is likely to generate the greatest number of complaints. It is suggested that noise associated with range operation needs to be addressed as part of any future development proposals and approvals in affected communities near NSF Dahlgren, which should include the use of sound attenuation measures in retrofitting and new building construction.

Source: Navy Operational Noise Consultation for NSF Dahlgren, 2009

Existing Tools

Navy Operational Noise Consultation – Operational Noise Contours for NSF Dahlgren and NSF Indian Head, September 2009

The Navy conducted an Operational Noise Consultation in 2009 for NSF Dahlgren and NSF Indian Head. The purpose of this consultation was to develop average noise contours based on typical weapons firing activities at the two installations. The consultation identified the Noise Zones I, II, and III and the LUPZ and showed the areas where the noise zones could impact civilian communities. The document also states where noise-sensitive uses are not recommended to promote compatibility.

Navy Operational Noise Management Program

The Navy utilizes an operational noise management program at NSF Dahlgren to address noise complaints received from the public. This program is operated by NSWCDD in collaboration with the NSASP PAO who monitors and records complaints that are received. When a complaint is received, it is investigated to determine the cause and information that may have caused the sound to be louder than normal, such as weather events or location of the source. After an investigation is complete, the complainant is informed of the results and in some cases, measures may be taken to reduce the noise output in certain areas through adjustments in firing activities. The PAO maintains a list of citizens who have requested to be notified when predicted noise levels will be greater than normal. The NSWCDD maintains a website (http://www.navsea.navy.mil/nswc/dahlgren/PAO/index.aspx) that provides several items to inform the public of what types of operations are likely to occur. The website includes information such as:

- The range schedule,
- A toll-free range / weapons testing hotline for daily information,
- A toll-free number for noise comments and questions, and
- The local phone number for the PAO.

Sound Intensity Prediction System

The Navy uses a state-of-the-art Sound Intensity Prediction System (SIPS) computer modeling program to predict the likelihood of planned weapons firing events resulting in excessive noise in the region surrounding the PRTR. This modeling program analyzes factors such as the amount of sound energy from weapons systems, current weather conditions, and the landscape / topography of the area to produce a model of where the noise is most likely to occur and how loud it will be. During times that the

estimated noise will be heavy in populated areas, testing may be postponed until more favorable conditions occur. This tool was developed by the NSWCDD and is used nationally by the DOD at other heavy weapons sites.

Peak Noise Measuring

The NSWCDD operates nine noise-measurement sites around NSF Dahlgren and along the PRTR to monitor peak-noise levels during weapons firing and explosive testing activities. These sites monitor actual noise levels during activities and provide information to improve the SIPS prediction model. The data is also used to determine if noise levels are acceptable at populated areas to continue the activity, or if it should be stopped to avoid impacting civilian communities.

Issue NOI-2	**Noise Levels Limit Opportunities to Increase Nighttime Operations.** Due to the risk of noise complaints from off-installation neighbors related to the proposed operational noise, the Navy has limited their operations. Although no federal law prohibits military training and testing activities from making noise, the Navy has limited their nighttime operations to avoid community conflicts.

In an effort to respect the sensitivity of local communities, the Navy limits nighttime operations at NSF Dahlgren. Noise is more noticeable at night when other ambient sounds such as traffic are not as prominent. Additionally, noise heard at night is generally considered a greater nuisance than daytime noise since this is when the majority of people are present in their place of residence.

Federal regulations do not generally prohibit nighttime training activities, but military installations are often encouraged or recommended to not perform high-noise causing activities between certain hours, generally 10:00 pm to 7:00 am. The Navy's voluntary decision to limit training activities at night helps to mitigate the amount of complaints from neighboring communities. The most common noise-sensitive use that is affected by nighttime weapons firing is residential and tourist lodging, such as hotels.

The current operation schedule for NSF Dahlgren is adequate to support existing missions and activities at the installation, but if new missions are contemplated for NSF Dahlgren in the future, the limit on nighttime training availability may be a consideration.

Existing Tools

PRTR Hours of Operation

The normal hours for weapons firing operations in the PRTR are between 8:00 am and 5:00 pm on weekdays and not on Saturday, Sundays, or national holidays. Firing infrequently occurs between 4:00 pm and 10:30 pm. In times of national emergency, firing may take place between 6:00 am and 10:30 pm daily except on Sundays.

Public Affairs Office, Naval Support Activity South Potomac

The NSASP PAO currently monitors and records complaints in collaboration with the NSWCDD Corporate Communications Office. These activities include a web presence, toll-free hotline, and community outreach. Colonial Beach has three noise monitoring locations along its waterfront and Swan Point has two. The 2009 Operational Noise Consultation recommended that NSWCDD should continue its public outreach program due to the determined risk of noise complaints. One of the identified tools for increasing the installation's ability to monitor risk of noise concern is the SIPS.

Newcomers to the area will benefit from publicly released information available on the Public Affairs Office website about the noise caused by activities at NSF Dahlgren. Increased community awareness will allow for these potential residents to choose to live in areas that will provide them with the highest quality of living. As a result, residents with a prior knowledge of military activity are less likely to complain about associated noises.

Issue NOI-3	**Lack of Noise Zone Awareness by Community.** Additional testing and potential expansion of air mission will result in increased noise impacts above current levels. Additional public relations and awareness efforts will be needed as the area continues to grow. ■ Noise zones and descriptions are not publicly available or included on land use planning maps. ■ Newcomers often move to the area without any awareness of military operations or presence.

There is a perceived lack of publicly available information on noise zones that prevents the public from understanding how its land use planning overlaps with military activities. The NSWCDD maintains a Public Affairs Office that provides pertinent information to the public on noise and operations that may impact them. The Public Affairs Office operates a website accessible to the public to review information that they may be unaware of regarding noise activities, as well as to contact information to get in touch with someone if they have questions, comments, or concerns. Improving access and awareness of viable information relevant to noise will help to increase public knowledge on operations and noise associated with NSF Dahlgren. This improvement in community engagement could help lessen the degree to which residents in neighboring communities complain about the noise. While noise is inevitable in the operations at NSF Dahlgren, a growing effort to inform the public will help to promote an accord between the installation and its neighbors.

Community advocacy promotes public transparency regarding NSF Dahlgren noise zones. Improving current efforts and introducing new ones will foster a better understanding and acceptance of noise generated by the installation.

Source: Navy Operational Noise Consultation for NSF Dahlgren, 2009

Existing Tools

Public Affairs Office, Naval Support Activity South Potomac

The NSASP PAO currently monitors and records complaints in collaboration with the NSWCDD Corporate Communications Office. These activities include a web presence, toll-free hotline, and community outreach. Colonial Beach has three noise monitoring locations along its waterfront and Swan Point has two. The 2009 Operational Noise Consultation recommended that NSWCDD should continue its public outreach program due to the determined risk of noise complaints. One of the identified tools for increasing the installation's ability to monitor risk of noise concern is the SIPS.

Newcomers to the area will benefit from publicly released information available on the Public Affairs Office website about the noise caused by activities at NSF Dahlgren. Increased community awareness will allow for these potential residents to choose to live in areas that will provide them with the highest quality of living. As a result, residents with a prior knowledge of military activity are less likely to complain about associated noises.

Issue NOI-4	**Potentially Incompatible Land Uses Located and Permitted in Military Influence Areas.** Noise complaints are often received from Swan Point, Colonial Beach, Cobb Island and other areas along the Potomac River waterfront. Waterfront properties are an asset to local jurisdictions; however, continued development in these areas may increase incompatibilities as a result of additional people being exposed to elevated noise levels, the potential for increased competition for waterway access, etc. If not guided appropriately, continued growth in these areas has the potential to require military workarounds or disruption in schedules to resolve conflicts.

A lack of compatibility between local zoning ordinances and the NSF Dahlgren noise contours can result in incompatible development in and near military operational areas. There is no zoning overlay or noise zone relating to NSF Dahlgren in the zoning ordinances for Charles County, King George County, Westmoreland County, or the Town of Colonial Beach.

Coordinated zoning allows jurisdictions to ensure that sensitive land uses are not permitted by right in areas with elevated noise levels. In order to foster development aligned with military operations, jurisdictions that experience increased noise caused by military activities must take measures to ensure that supportive zoning protects sensitive land uses from elevated noise levels.

Since much of the new development in neighboring communities is located along the water, residential uses are becoming more exposed to noise from military operations. The growing number of residents on this desirable land presents a challenge because it increases the noise-related concerns and complaints. Jurisdictions must be aware that by promoting development along their waterfronts, they subject a larger number of residents to noise generated by the installation.

Swan Point, an unincorporated community in southern Charles County, is located in the LUPZ and under the authority of the county Comprehensive Plan and Zoning Ordinance. It is designated as a mixed use district, integrating residential, commercial, industrial and institutional uses with the purpose of developing a sustainable community.

Cobb Island is also under the authority of the Charles County Comprehensive Plan and Zoning Ordinance. It is a water-oriented village preserved to maintain the county maritime and seafood industry. Charles County regards it as a tourism destination but is still considered to be a rural community.

While the Comprehensive Plan acknowledges that these communities are affected by noise generated by NSF Dahlgren, it provides no consideration to guide or manage development based on noise. Charles County is currently updating its Comprehensive Plan and may include more goals to improve coordination with NSF Dahlgren.

Cobb Island is located at the intersection of the Potomac and Wicomico Rivers and although it is not located within the LUPZ, it is highlighted as a location of concern due to the increasing activity on the island. Charles County has indicated that it would like to extend more public services to Cobb Island in coordination with anticipated development.

Some unincorporated areas of King George County within NSF Dahlgren's noise zones have been developed with residential uses and may be further developed in the future. Several residences have been built south of the EEA in Noise Zone II and the community of Dahlgren to the west of Mainside has experienced new residential construction in Noise Zone II adjacent to NSF Dahlgren because of "as of right" zoning. Some of these uses may have been built with sound attenuation measures but it is not required. Table 5-12.2 shows the incompatible uses that are allowed in the zoning districts located within Noise Zone II.

Table 5-12.2. Incompatible Land Uses Allowed in King George County Zoning Ordinance Located within NSF Dahlgren Noise Zone II

Zoning Category	Incompatible Uses Permitted
A-1: Limited Agriculture	Farm Dwelling, Single-family dwelling, group home, family day home, manufactured home, temporary dwelling, bed and breakfast*, place of worship*, day care facility*, school*
A-2: Rural Agriculture	Duplex, family day home, group home, manufactured home, temporary dwelling, bed and breakfast*, place of worship*, day care facility*, nursing home*
R-1: One-Family Dwelling	Single-family dwelling, family day home, group home, place of worship*, day care facility*, nursery school*
R-2: General Dwelling	Single-family dwelling, day care facility, duplex, family day home, group home, nursery school*
R-3: Multifamily Dwelling	Single-family dwelling, duplex, multifamily dwelling, day care facility, family day home, group home, nursery school, townhouse

**Permitted only by special exception*
Source: King George County Zoning Ordinance; DoD Practical Guide to Compatible Civilian Development near Military Installations, 2005

The Town of Colonial Beach is the closest largely developed waterfront area to the noise zones for NSF Dahlgren. Its northern tip is located in Noise Zone II and it is almost entirely located in the LUPZ. However, the majority of its zoning is for residential or commercial uses. The zoning does not include any compatibility consideration for NSF Dahlgren noise zones. While the vast majority of Colonial Beach is located within the LUPZ, the northernmost tip of the town is located in Noise Zone II and is most susceptible to noise. This area includes the neighborhood of Bluff Point and parts of Riverside Meadows. Aside from a fragment of a commercial parcel in Bluff Point, these communities consist entirely of the Neighborhood Preservation, Public Open Space, and Conservation zoning districts. Table 5-12.3 identifies incompatible uses that are either permitted by right or with a conditional use permit, designated by the asterisk, within the Colonial Beach Zoning Ordinance. The uses identified in the table are either incompatible or would require sound attenuation in building construction to be considered compatible.

Table 5-12.3 Incompatible Land Uses Allowed in Colonial Beach Zoning Ordinance Located within NSF Dahlgren Noise Zone II

Zoning Category	Incompatible Uses Permitted
R-1: Residential Limited	Single-family dwelling, group home, family day home, place of worship, family healthcare structure, assisted living facility*, bed & breakfast*, nursing home*, school*
R-2: Residential General	Single-family dwelling, group home, family day home, place of worship, family healthcare structure, tourist home*, bed & breakfast*, nursing home*, school*

**Conditional Use Permit Required*
Source: Town of Colonial Beach Zoning Ordinance; DoD Practical Guide to Compatible Civilian Development Near Military Installations, 2005

Existing Tools

Charles County Comprehensive Plan

The Charles County Comprehensive Plan is in the process of being updated. The update will include some actions that were recommended through the recent completion of a JLUS for Blossom Point Research Facility. The updated Plan will include goals to support and protect Blossom Point Research Facility, but the current draft as of October 2014 does not list what they will be. In conjunction with this, the Plan recognizes the county's proximity to NSF Dahlgren and that military operations produce noise that is heard in parts of the county close to the Potomac River. Once the final plan is completed, it may include goals to promote compatibility around areas affected by noise caused by NSF Dahlgren operations. An update to the county's zoning code may also be a part of the Comprehensive Plan update that may protect areas affected by noise.

Issue NOI-5	**Current Building Codes do not Address Sound Attenuation.** Local jurisdictions do not require sound attenuation for residences in locations subject to elevated noise levels.

Jurisdictions do not include sound attenuation standards in their building codes for structures within the NSF Dahlgren noise zones. As a result, some of the residences built within these areas may not have insulation or construction to reduce the sound from testing operations to an acceptable level inside the structure.

Charles County has adopted the 2012 International Building Code, which does not address sound attenuation to mitigate noise caused by military weapons firing. The county is currently updating its Comprehensive Plan to include policies and goals that address military operations, and may include policies regarding noise from NSF Dahlgren to promote compatibility. It should be noted that Charles County is not within the NSF Dahlgren Noise Zone II, but is partially within the LUPZ.

St. Mary's County utilizes the 2009 International Building Code and does not require sound attenuation for areas along the Potomac River that may be affected by noise caused by NSF Dahlgren. It should be noted that St. Mary's County is not within any of the NSF Dahlgren noise zones.

The Virginia Uniform Statewide Building Code is used by many of the jurisdictions in the Commonwealth of Virginia, including King George County, Westmoreland County, and the Town of Colonial Beach. It includes

a section on noise attenuation around airports, but does not mention noise attenuation related to weapons firing activities at NSF Dahlgren. The noise attenuation applies to construction of residential dwellings less than three stories tall.

Developers and builders have expressed concerns regarding the lack of information on sound attenuation measures. If sound attenuation measures do not exist within the NSF Dahlgren noise contours, developers are unlikely to construct homes and other noise-sensitive buildings with noise level reducing materials, which could lead to the proliferation of incompatible uses within noise contours.

Source: Code of Charles County, 2013; International Building Code, 2012; Virginia Uniform Statewide Building Code, 2012

Public Trespassing

This factor addresses public trespassing, either purposeful or unintentional, onto a military installation. The potential for trespassing increases when public use areas are in close proximity to the installation.

Military areas that are located on, or adjacent to, public lands owned by other entities (i.e., federal, state, or local) that are designated for public access, recreation, or for livestock grazing often experience issues related to public trespassing into training ranges and other areas with safety hazards related to military operations.

Compatibility Assessment

Issue PT-1	**Public Trespassing Occurs Along NSF Dahlgren's Waterfront.** NSF Dahlgren is accessible from the waterfront. This open access has resulted in trespassing incidents when boaters get too close to the installation.

The Potomac River borders both the Mainside and the EEA on their eastern shores. Open access along the Potomac River has resulted in trespassing incidents when boaters get too close to the installation. With no physical barrier on the river, boaters can travel through the test range and into the installation, posing a risk to military operations and safety concern.

The water perimeter of Mainside and EEA includes signs posted every 50-100 feet warning against trespassing and landing on the installation. The visibility of these signs helps to mitigate trespassing during the day. Consequently, the effectiveness of relying on these signs decreases during night time.

Trespassing is inhibited in part due to regular monitoring of the waters by range boats. NSWCDD coordinates with the Coast Guard to clear civilians from testing areas or from encroaching on installation borders. The primary concern for trespassers is safety on the water during operations using the PRTR but also a concern for terrorism. While most trespassers may be cooperative and leave the installation without hesitation, there is no way of assessing the motives of mariners encroaching into NSF Dahlgren's boundaries.

Source: Public Health Assessment for NSF Dahlgren, 2006

Existing Tools

Regulations for Safe Boating in the Middle Danger Area of the Potomac River- Naval Support Facility Dahlgren Brochure

This brochure details the Middle Danger Area of the PRTR and identifies some regulations for boaters in the interest of the safety of watercraft traffic on the Potomac River. The brochure states that entry into this area is hazardous in general to watercraft when guns, ordnance, or other items are being tested by personnel at NSWCDD. Pursuant to the brochure, in order to assure that no watercraft is endangered by firing, NSWCDD positions range boats with white hulls and orange superstructures in the proximity of areas rendered hazardous by firing. These boats and their operators have the responsibility of insuring that no watercraft is endangered as a result of range operations or firing. These boats are normally positioned at one of several range boat stations. The brochure

details a few regulations pertinent to watercraft operators and how to comply with safety measures. These regulations are:

- When range boats are flying a red flag, watercraft must not enter any portion of the danger area or operate in the proximity thereof without first having obtained permission from the captain of the nearest range control boat. A siren sounded at a watercraft from a range control boat is a signal to come alongside for instructions as to how to proceed and areas that must be avoided.
- All craft desiring to enter the Middle Danger Zone to proceed in or out of Upper Machodoc Creek during firing hours will be instructed by the patrol boats.
- Firing schedules are arranged to cause minimum inconvenience to river traffic and generally the range is not closed for long periods of time. It is possible that firings may be conducted in the LDZ. If this occurs, range boats will be dispatched to the area.
- Entry to all danger zones described in the U.S. Coastal Pilot 3, Atlantic, when firing is in progress without specific clearance by proper authorities is prohibited per regulations promulgated by the Corps of Engineers, U.S. Army. Although captains of the range control boats are authorized to enforce these regulations, NSF Dahlgren, desires to cooperate with and assist operators of all watercraft operating in the MDZ.

Source: NAVSEA Dahlgren Brochure: Regulations for Safe Boating in the Middle Danger Area of the Potomac River.

Naval Support Facility Dahlgren Public Health Assessment

The Public Health Assessment (PHA) developed for NSF Dahlgren details one public health issue that relates to safety for recreational users of the Potomac River. The concern related to public health is that members of the surrounding communities have been concerned about the safety of using the river for recreational purposes due to NSWCDD testing activities. Specific concerns include coming into contract with unexploded ordnance (UXO) in the river or on beaches, and concern about navigational hazards in the river such as unmarked pilings.

The PHA describes the evaluation of the issue, in which mitigation measures are detailed. Aside from markers and signs to educate watermen, the PHA states that NSWCDD employs range boats to warn recreational boaters of resting on the river. Additionally, the boats use red flags, buoys and sirens to warn river users. Other methods of monitoring public safety for river users include surveillance cameras, radio communications between the Range Control Office and river users, and warning signage. The conclusion of the issue states that boaters who consult charts, follow safe boating practices and follow direction of range control boats will not be exposed to safety hazards.

Source: NSF Dahlgren Public Health Assessment, 2006.

Navy Instruction 3571.4: Operational Range Clearance Policy

OPNAV Instruction 3571.4 is the Navy Instruction for operational range clearance policy for Navy installations, which includes NSF Dahlgren and the associated PRTR. As the instruction describes, the objective of range clearance is to sustain readiness, be environmentally responsible, and to maintain public safety. One of the mandates in the instruction is for outreach programs to be established within range clearance plans to educate the public about hazards from UXO and of trespassing on operational ranges. This instruction also includes the mandate for recording all range clearance activities, which would include monitoring and assessing the use of civilian and commercial watercraft and their potential for public trespassing along the NSF Dahlgren waterfront access.

Northern Neck-Chesapeake Bay Public Access Authority Act

The Northern Neck Chesapeake Bay Public Access Authority Act was established to increase the use of existing public-access sites along the bay area. The Act establishes a public access authority known as the Northern Neck Chesapeake Bay Public Access Authority. The Authority is able to determine public access site locations based on their communication with the residents of the communities. These discussions between the Authority and the residents are a good starting point for future communication with NSF Dahlgren, but must evolve further. With this communication the Authority may be able to assist the community and NSF Dahlgren by

communicating the operations and missions of the installation to the public in an educational manner.

Findings

- Although there are several tools that are used to notify the public of operations and range activities at NSF Dahlgren, none of these tools address public trespassing on the installation.
- Range Safety is clearly an issue that NSWCDD and NSASP personnel deal with on a regular basis.
- Range Safety brochures discuss safety measures for educational outreach purposes, but do not warn boaters of repercussions for coming to close to, or onto, the NSF Dahlgren installation.
- While the Navy instruction details regulations and policy for range clearance, it does not discuss policy and regulation for dealing with public trespassing during range clearance activities.

Roadway Capacity

Vehicular access to and from NSF Dahlgren is essential for safe and efficient operations. NSF Dahlgren's somewhat unique location (along the coast), the limited number of primary surface roads, and limited number of Mainside gates all exacerbate congestion on critical roads. Security and operational needs, the level of civilian employment at the installation, limited on installation housing, and general growth in the area (both current and anticipated) also contribute to congestion on these roads.

Compatibility Assessment

Issue RC-1	**Roadway Capacity Near B Gate Has the Potential to Increase Safety Concerns.** Traffic entering B Gate gets backed up, causing safety concerns. Travel speed is a concern in this area.

NSF Dahlgren's B Gate is located at Bennion Road, off of James Madison Parkway (US Route 301) as illustrated in Figure 3-2. US Route 301 skirts the northern boundary of NSF Dahlgren and is one of the main arterials in King George County. As US Route 301 heads east past Mainside it crosses the Potomac River and connects to Southern Maryland. Gate B is the secondary entry gate to NSF Dahlgren and enters in the north central part of the installation, adjacent to Gambo Creek, which bisects the installation. Because the majority of government personnel at NSF Dahlgren use privately owned vehicles (POVs) rather than government vehicles, the gate's capacity is strained during peak hours. Though the majority of employees enter through the Main Gate on the southwest corner of the installation, significant backups also occur during peak hours at Gate B.

Roadway capacity at NSF Dahlgren's Gate B is inadequate to serve the demands of in-bound traffic. The main roadway leading to B Gate is US Route 301, a two-way divided roadway. The eastbound section of the roadway is three through lanes and two right hand turn lanes at the intersection of Bennion Road. The westbound section of the roadway is three through lanes and a single left hand turn lane at the intersection of Bennion Road. The gate is located approximately 300 feet from the intersection of Bennion Road and US Route 301, and traffic entering this gate is often backed up. Because US Route 301 is a high-speed arterial with speeds over 50 miles per hour in some sections, it is a safety concern to have cars queued in the intersection. The 2007 traffic counts on US Route 301 at Owens Lane (turns into Bennion Road) indicate a volume of approximately 3,500 vehicles during the morning peak hours, and approximately 3,380 during afternoon peak hours –indicating a high volume of vehicles on this primary arterial.

The NSF Dahlgren 2011 Master Plan indicates the needs for improvements at both gates, for safety and circulation reasons. Although, consideration of potential changes in the future mission of NSF Dahlgren has not been addressed in the proposed gate improvements provided in the Master Plan.

Source: Google Maps, 2013; NSF Dahlgren Master Plan, 2011 pp. 3-11 & 3-12, WalMart TIA

Existing Tools

King George County Comprehensive Plan

Some of the transportation goals that are found in the King George County Comprehensive Plan are directly related to improving roadway capacity along major thoroughfares in the County. All of these goals apply to Route 301, which is one of the main roads that lead to Gate B at NSF Dahlgren. These goals include:

- For heavily traveled roads, such as Route 301 and Route 206, encourage alternate routes.
- Encourage access management to protect through-traffic flow on principal roads.
- Institute and implement access-management policies for development adjacent to all major roadways.

Included as part of the Comprehensive Plan are access management and roadway capacity implementation policies. These are found within the Transportation Plan and provide goals and objectives further related to the capacity of county roadways and strategies to improve access management.

- Incorporate access management regulations for development adjacent to all major roadways, especially Routes 3, 301, 205, 206 and 218. The purpose of the policies should be the protection of long term peak-period capacity use of roadways, enhancement of safety and to facilitate through-traffic flow on these principal roads.
- Preserve and improve the safety and capacity of the major road corridors in the County by working closely with landowners and developers to establish and implement effective access-management policies, including ensuring that appropriate land uses occur along the major roadways.
- Encourage coordination with neighboring localities and Virginia Department of Transportation (VDOT) to minimize traffic congestion.

While these goals are well suited to assist in the reduction of traffic congestion, they have the potential to accommodate induced demand. Access management regulations may be a good tool for managing points of access and future roadway capacity along US Route 301 near Gate B. Although it is not certain that these goals or regulations will have any effect on the actual congestion or safety concerns associated with cars entering at Gate B during peak hours. One possible recommendation that may have been overlooked is the potential for decreasing the speed limit along US Route 301 proximate to the NSF Dahlgren exits, which would increase safety.

One goal of the Comprehensive Plan that may adversely impact the roadway capacity and level of service along the roads proximate to NSF Dahlgren's Gate B redirects future growth to certain areas in the county.

- Encourage the majority of residential and employment development to locate in and around the Courthouse and the Dahlgren Primary Settlement Areas, each with a mix of land uses and densities.

Effects of following through with this last goal could bring the potential for higher densities and additional residential enclaves in the Dahlgren PSA in proximity to NSF Dahlgren. This would possibly create further traffic congestion along US Route 301 and potential additional roadway capacity issues in the area. If circulation is congested at B Gate during peak hours and there is added roadway traffic from new development, it could pose additional safety and even environmental concerns.

Source: King George County Comprehensive Plan, 2013

George Washington Regional Commission 2035 Transportation Plan

Infrastructure improvements such as widening of major arterials and improving signal timing may have the potential to create induced demand, although it would also accommodate for faster circulation, overall reduced traffic congestion, and easier access to and from NSF Dahlgren gates.

Some of the recommendations provided for King George County in the 2035 Regional Transportation Plan are for thoroughfares proximate to B Gate and affect their roadway capacity. These recommendations include:

- VA-206 (Dahlgren Rd.): widening the road to four lanes west of VA-614 to VA-301.
- US 301: Widening to rural 6-lane with median from VA-206 to VA-614.
- US 301 (James Madison Pkwy.) at VA-206 (Dahlgren Rd.): Improve signal timing; Provide additional capacity for eastbound left turn and southbound right turn movement.
- US 301 (James Madison Pkwy.) at VA-614 (Owens Dr.): provide additional capacity for east and westbound approach.

Widening VA Route 206 at US Route 301 and providing additional capacity for eastbound left turns could potentially bring more commuters to the Main Gate and help alleviate some of the traffic caused by congestion at the B Gate. Widening US 301 to six lanes from VA Route 206 to Route 614 could potentially decrease the amount of traffic influenced by congestion at the B Gate, as more drivers would be able use the additional lanes to circumvent the cars turning onto Bennion Road. Additionally, providing additional capacity for eastbound and westbound turns at the US 301 and VA Route 614 intersection could help alleviate some of the backup and wait times for commuters waiting to enter the installation through B Gate. These recommendations are vital to the continued capacity and effectiveness of the local roadways in King George County proximate to NSF Dahlgren, and implementation of these planned improvements would increase the future capacity associated with some of these roadways segments. Future coordination between King George County and NSF Dahlgren personnel will be paramount for collaboration aimed at reducing traffic congestion and increasing capacity at the B Gate.

Source: George Washington Regional Commission 2035 Transportation Plan.

Naval Support Facility Dahlgren Transportation Improvement Plan

According to the NSF Dahlgren Transportation Improvement Plan, a majority of the traffic congestion issues in the area are taking place proximate to NSF Dahlgren Gate B, along US Route 301 and at the Main Gate on Route 206. Recorded gate volumes show that only 37% of traffic used Gate B for inbound and outbound access. This may not be reflective of the congestion that takes place at B Gate, although it does detail the need for additional capacity.

Within the TIP, section 3 gives predictions for potential 2018 traffic counts, level of service ratings, and infrastructure capacity. The 2018 projections expect the level of service at the Main Gate and B Gate to remain rated at E or F during the AM peak periods. This may not be reflective of what actual level of service ratings would be in 2018, due to potential mission changes and possible infrastructure enhancements.

External transportation enhancement recommendations include improving US Route 301 and State Route 206 intersections through enhancing traffic signal timing, as mentioned in the George Washington Regional Commission 2035 Transportation Plan. Another external recommendation was for improvements to Gate B including the possible construction of a new Gate B with changes to comply with Anti-Terrorism / Force Protection standards and address traffic queues and safety concerns. Potential alternatives listed for recommendations of Gate B are:

- Alternative 1 - Retaining existing Gate B, construct a four-lane entrance with furthest left lane being reversible. Separate three-lane commercial vehicle inspection facility.
- Alternative 2 - Retaining existing Gate B, construct a four-lane entrance as inbound lanes, two separate lanes for outbound traffic, and a separate three-lane CVIF.

- Alternative 3 - Retain existing Gate B and construct new gate on U.S. Route 301.
- Alternative 4 - Retain existing Gate B and construct new inbound only gate on U.S. Route 301.

Per the TIP, Alternative 2 was the preferred alternative, with a few changes to be made to the alternative to address the intersection operations. These changes include:

- Revise the northbound Potomac Drive approach to Intersection #14 (U.S. Route 301/Potomac Drive/Owens Drive) to consist of two left-turn lanes, one through lane, and one right-turn lane. Such a design would result in the intersection LOS changing from LOS F to LOS D.
- Revise Intersection #1 (Bennion Road/Blandy Boulevard/Aegis Way) to provide the right-turn lane from Blandy Boulevard to form its own lane along Bennion Road and connect to Intersection # 14. Blandy Boulevard would not be required to stop at the stop sign and could continue toward the exit, minimizing potential queues along Blandy Boulevard.

If the existing gate was maintained and given the proposed additional entry lanes equipped with added checkpoint personnel, the issue could be potentially diminished. This last recommendation could also potentially divert traffic to a new gate location or accommodate additional traffic, possibly removing the issue of congestion along US Route 301 and at the B Gate entrance.

Source: NSF Dahlgren Transportation Improvement Plan, 2012.

Findings

- There are many planned infrastructure improvements that would increase the capacity on highways and local roadways, lower traffic congestion although it is hard to deduce whether or not they will be implemented.
- Pursuant to the GWRC 2025 Plan, roadway widening and bicycle lanes could sincerely reduce the amount of cars on the road which would increase capacity and possibly decrease congestion near Gate B.
- Many of the recommendations given in the TIP could increase circulation, decrease congestion, and improve LOS ratings, although some recommendations may create further conflict.
- The TIP should be updated every few years to accommodate any capacity changes and infrastructure enhancements.
- External (outside of Dahlgren) transportation recommendations should be integrated into the GWRC Regional Transportation Plan, as well as the KGC Comprehensive Plan. KGC Capital Improvement funding could be used for some of these recommendations, which would allow for enhanced capacity and circulation along primary County roads.
- Construction of new Gate B could be a potential solution to congestion at the existing gate, dependent on facilities at the new gate. Two or three entrance lanes all with their own checkpoint security would significantly increase the circulation into the installation from that gate.
- Enhancing traffic signaling and widening the road along US Route 301 could also significantly decrease the amount of congestion that forms at the B Gate.

Issue RC-2	**Installation Traffic Creates Back-ups in the Community Near NSF Dahlgren's Main Gate.** Traffic backs up into the community and near a school during peak times, causing safety concerns for pedestrians and vehicles accessing the affected neighborhoods.

As new development occurs in the region, additional traffic generation will be a major concern. According to regional stakeholders, there are already

issues with traffic queuing at NSF Dahlgren's B Gate, and they will only be exacerbated by further regional development. A transportation impact analysis (TIA) was submitted to King George County, VA by Walmart in 2007 for a proposed development which highlighted the rapid pace of growth and accompanying traffic impacts in the region. Each of the uses within the proposed project was given a traffic generation rate in the TIA, and from that rate, projected traffic conditions are created. Projected traffic counts for 2018 are provided in order to estimate a future condition for traffic on the subject roads. As of 2014, this project located on either side of US Route 301, along Commerce Drive, has been almost entirely built out and the commercial and retail institutions there serve a large population of King George County, including the majority of personnel at NSF Dahlgren. While the Walmart complex is proximate to the installation, traffic that is induced from the supercenter is not expected to have an immediate effect on the congestion taking place at the respective gates.

To the west and southwest of NSF Dahlgren is the Dahlgren PSA. King George County's Comprehensive Plan proposes an increase in both residential and commercial density within this PSA. Increasing intensity in the Dahlgren PSA will exacerbate traffic problems both regionally and locally near the boundaries of NSF Dahlgren and specifically the Main Gate. Currently during peak hours, there is traffic congestion and backup into the community from the Main Gate that causes safety concerns for both pedestrians and vehicles in the community.

The NSF Dahlgren Master Plan calls for a study of the feasibility of a bus or taxi system for personnel in the near future. The feasibility of such a system has not yet been evaluated.

Source: Walmart TIA; NSF Dahlgren Master Plan, 2011, King George County Comprehensive Plan, 2013

Existing Tools

Due to the similar nature of the issues, all of the tools analyzed in the previous issue (RC-1) and the following issue (SAF-1) apply to this issue.

Naval Support Facility Dahlgren Transportation Improvement Plan

Pursuant to the findings in the TIP, it seems a majority of the congestion issues are taking place proximate to NSF Dahlgren Gate B, along US Route 301 and at the Main Gate along Route 206. Recorded gate volumes at NSF Dahlgren show that 63 percent of traffic used the Main Gate for inbound and outbound access. This is most likely due to the fact that the installation's residential areas, off-installation and on installation (including the Dahlgren Town Center), are located proximate to the Main Gate. Congestion at the Main Gate could also be attributed to the fact that it has only one lane of inbound traffic, while Gate B has two.

Section 3 of the TIP gives predictions and assessments of potential 2018 traffic counts, LOS ratings, and infrastructure capacity. The 2018 projections expect the LOS at the Main Gate to be rated at E or F during the AM peak periods, although it mentions that further analysis would require an additional study. While a good model for looking into the future, projections could be skewed due to factors such as mission changes, or additional suburban subdivision development.

Several recommendations for external transportation enhancements include improving US Route 301 and State Route 206 intersections through enhancing traffic signal timing. Other external recommendations are the possible relocation of Gate A and the potential implementation of long-term access actions.

Recommendation EX-3 is for the relocation of the Main Gate at NSF Dahlgren. The recommendation states that the gate will experience an average queue of more than 1,000 feet and an above average queue of over 1,500 feet during the AM peak hour. It also states that any queue of over 200 feet would impact the residences and businesses along Route 206, while a queue of roughly 2,000 feet would impact the major intersection at Potomac Drive, causing safety concerns. To address these long wait lines and to adhere to AT / FP regulations, the recommendation for the Main Gate includes:

- Construct a new Main Gate east of the Post Office, between Dahlgren Road and First Street, that is AT/FP compliant;

- Conduct a Main Gate queue analysis study to determine the appropriate number of lanes and security personnel to operate the new gate in order to keep queues out of the Dahlgren community.

Another external recommendation for the Main Gate is the creation of an external Alternative Mobility Hub (AMH). This mobility hub would include a future public transportation stop from the Fredericksburg Regional Transit and bicycle and/or shuttle stops. The AMH would also contain pedestrian amenities and services, providing for a full range of multi-modal solutions, potentially decreasing automobile usage.

Internal transportation recommendations provided in the TIP are broken up by complex (North, South, West, and Town Center) and included the addition of bike lanes, replacing or installing signage, striping lane lines and potentially widening heavily used roads. These internal recommendations have little to do with improving LOS due to the fact that most on installation roadways had ratings of A and B, with the exception of Aegis Way. One of the internal recommendations that impact the NSF Dahlgren Main Gate is recommendation TC-1, which is to widen Dahlgren Road on the interior of the installation.

The central component of this recommendation is the widening of Dahlgren Road between the Main Gate and Bronson Road to include a new center-turn lane, which would potentially decrease queues located at the gate which are waiting to exit the installation.

Source: NSF Dahlgren Transportation Improvement Plan, 2012.

Findings

- Roadway widening's, an alternative mobility hub, and bicycle lanes could sincerely reduce the amount of cars on the road which would increase capacity and possibly decrease congestion near the Main Gate.
- There are many local planned infrastructure improvements that would lower traffic congestion although it is hard to deduce whether or not they will be implemented or if they will affect queues at the Main Gate.
- Many of the recommendations given in the TIP could increase circulation, decrease congestion, and improve LOS ratings, although some recommendations may create further conflict.
- The TIP is a great tool for studying gate locations and access management and should be updated every few years to accommodate any capacity changes and infrastructure enhancements.
- External (outside of NSF Dahlgren) and internal transportation recommendations (geared towards the gates) should be integrated into the George Washington Regional Commission (GWRC) Regional Transportation Plan, as well as the King George County Comprehensive Plan. King George County Capital Improvement funding could be used to assist some of these recommendations, which would allow for enhanced capacity and circulation along primary county roads and / or decrease traffic queues at the gates which would alleviate congestion and enhance safety within the community.
- Enhancing traffic signaling and widening the road along US Route 206 could also significantly decrease the amount of congestion that forms at the Main Gate.
- Depending on the potential locations, relocating the Main Gate could either be the solution to low LOS ratings and high wait times during peak hours, or cause further congestion in the area due to the fact that most on installation residents would have to reroute their commutes on and off-installation.
- Future residential development in the Dahlgren PSA may exacerbate traffic congestion and further decrease the LOS at the gates.

Safety

Safety zones are areas in which development should be more restrictive, in terms of use and concentrations of people, due to the higher risks to public

safety. Issues to consider include aircraft accident potential zones, weapons firing range safety zones, and explosive safety zones.

Military installations often engage in activities or contain facilities that, due to public safety concerns, require special consideration by local jurisdictions when evaluating compatibility. It is important to regulate land use near military airfields in order to minimize damage from potential aircraft accidents and to reduce air navigation hazards. To help mitigate potential issues, the DOD has delineated Clear Zones (CZ) and Accident Potential Zones (APZ) in the vicinity of airfield runways. The APZ is usually divided into APZ I and APZ II. Each zone was developed based on the statistical review of aircraft accidents. Studies show that most mishaps occur on or near the runway, predominately along its extended centerline.

While NSF Dahlgren does not currently have a fixed wing air mission, an assessment of other safety issues pertaining to the installation and its operations is still needed. Safety issues include roadway safety hazards such as diminished Level of Service and unsafe explosive safety routes through the community. Additionally, if a fixed wing air mission was reintroduced at NSF Dahlgren, any existing incompatible development could pose a problem in existing runway and helipad safety zones and imaginary surfaces.

Compatibility Assessment

Issue SA-1	**Traffic Has Impacted Congested Emergency Response Routes.** Emergency response egress routes make access to service area (in King George County) from NSF Dahlgren difficult. Low levels of service on nearby roadways decrease the safety and efficiency of response.

Maintaining efficient and safe roadways is essential to ensuring effective emergency routes from NSF Dahlgren. In most scenarios, NSF Dahlgren personnel must travel through King George County should they need to evacuate the installation for any reason. A low level of service and high traffic congestion along highways and other roadways negatively impacts the installation's ability to access emergency response egress routes and provide mutual aid response to King George County.

One dilemma associated with development is the continued ability of emergency services to adequately respond to their entire service area. Traffic queuing to enter the installation causes traffic backups on both State Route 206 and US Route 301, creating circulation difficulties and safety concerns outside the installation perimeter. An increase in highway and roadway traffic in King George County is causing more congestion on the county's emergency response egress routes. As a result, services are increasingly unable to reach emergencies on time.

Existing Tools

King George County Comprehensive Plan

If NSF Dahlgren is proximate to several poorly performing roadways, it can be a major threat to the personnel on the installation should there be any reason for emergency or mutual aid response. The lack of efficiency restricts traffic flow and potentially prohibits fast and safe emergency response travel.

The VDOT uses Level of Service (LOS) to indicate capacity per unit of demand for a public facility. According to the King George County Comprehensive Plan, the six levels of service can be described as follows:

- **Level of Service A:** Free flow traffic with individual users virtually unaffected by the presence of others in the traffic stream.
- **Level of Service B:** Stable traffic flow with a high degree of freedom to select speed and operating conditions but with some influence from other users.
- **Level of Service C:** Restricted flow which remains stable but with significant interactions with others in the traffic stream. The general level of comfort and convenience declines noticeably at this level.

- **Level of Service D:** High-density flow in which speed and freedom to maneuver are severely restricted and comfort and convenience have declined even though flow remains stable.
- **Level of Service E:** Unstable flow at or near capacity levels with poor levels of comfort and convenience.
- **Level of Service F:** Forced traffic flow in which the amount of traffic approaching a point exceeds the amount that can be served. LOS F is characterized by stop-and go waves, poor travel times, low comfort and convenience and increased accident exposure.

The minimum VDOT standard for an acceptable level of service is a "C" grade. While the majority of King George County roads achieve this level or better, several major arterials received less than a "C" grade for their performance. These road segments in need of improvement are indicated in Table 5-15.1.

Table 5-15.1 Deficient Road Segments in King George County by Level of Service

Route	Segment	Level of Service
Route 206	East of US 301 into NSF Dahlgren	E
Route 218	From Rt. 610 to Rt. 206	E
Route 218	From Stafford County to Rt. 609	E
US 301	From Rt. 218 to the Potomac River	F
US 301	From Rt. 633 to Rt. 616	E
US 301	From Rt. 607 to Rt. 3	D
US 301	From Rt. 205 to Rt. 633	D

Source: King George County Comprehensive Plan, 2013

Several transportation and public safety goals that are found in the Comprehensive Plan are directly related to providing a better LOS and increasing access management along roadways in the County. These goals include:

- Encourage access management to protect through-traffic flow on principal roads.
- Encourage alternative routes for heavily traveled roads, such as Route 301 and Route 206.
- Establish and implement access-management policies for development adjacent to all major roadways.
- Ensure the availability of adequate emergency services to meet the needs of County residents.

Relative to the growth management concept presented in the Comprehensive Plan, one of the infrastructure concerns is the development of new roads.

- New roads and new development should be designed to interconnect and be developed so as not to reduce but to improve the existing LOS of County roads and highways.

Implementation policies within the Transportation Plan of the Comprehensive Plan provide goals and objectives further related to the LOS of county roadways and strategies to improve access management.

- Implement access management regulations for development adjacent to all major roadways, especially Routes 3, 301, 205, 206 and 218. The purpose of the policies should be the protection of long term peak-period capacity use of roadways, enhancement of safety and to facilitate through-traffic flow on these principal roads. These policies should include a limit to the number and spacing of traffic signals, curb cuts and median breaks.
- Maintain and improve the safety and capacity of the major road corridors in the County by working closely with landowners and developers to establish and implement effective access-management policies, including ensuring that appropriate land uses occur along the major roadways.
- Limit entrances to public roads to protect the capacity and safety of the network.
- Encourage coordination with neighboring localities and VDOT to minimize traffic congestion.

Public safety is also directly related to the LOS along County roadways, and mutual aid or emergency response between the NSF Dahlgren and the Town of Colonial Beach and King George, Westmoreland, and Charles counties can be impacted by diminished LOS roadways. The more populated and faster growing regions will need additional staffing to provide consistent emergency service delivery as development occurs. The services provided as part of these cooperative agreement would be impacted by additional development or poor LOS local roadways and highways located proximate to the installation.

Road improvements for deteriorating roadways or the construction of new roads within the county can help increase LOS and improve the ability of the roads surrounding the installation to accommodate emergency situations. Currently, the LOS of some roadway infrastructure in King George County is not appropriate to fit the emergency egress needs at NSF Dahlgren, nor are they adequate for providing proper access management associated with the mutual aid agreement.

Source: King George County Comprehensive Plan, 2013

King George County Fire, Rescue and Emergency Service Strategic Plan

The King George County Department of Fire, Rescue and Emergency Services created a five year Strategic Plan in 2012 intended to help guide the provision of efficient and effective emergency services to County residents. One of the underlying issues noted in the Plan is the need to provide the basic level of emergency service within the time required to initiate these services. The mutual aid agreements between King George County, other counties, and NSF Dahlgren help support this issue, although other factors such as development can still prohibit the provision of these services in an effective manner.

According to this Plan, King George County has three fire stations, one of which is located adjacent to NSF Dahlgren. The response district size for this station encompasses NSF Dahlgren and is approximately 49 square miles and, which is roughly 27 percent of the county's land. While this station may serve a large population of the county, possible traffic congestion along US Route 301 and other factors such as construction from development could diminish the potential for adequate response times from this station.

As part of the Strategic Plan, an action plan is provided which details annual goals and steps to take to achieve these goals. One of the goals for 2013 and 2014 is to publish a report identifying any changes in compliance with the National Fire Protection Association's (NFPA) Standard 1720, which provides standards for the organization and deployment of emergency and fire operations to the public. One of the steps to complete this goal is to provide an annual review of the standard, and complete a compliance matrix. One such matrix is provided in the Plan but is from 2010. Within this NFPA 1720 compliance matrix, an annual evaluation based on level of service, deployment delivery and response time objectives was deemed to have not met the NFPA standard. This evaluation could have been deemed less than adequate due to the potential impact traffic congestion can have on emergency response routes in King George County.

Source: King George County Fire, Rescue and Emergency Services Five Year Strategic Plan, 2012.

George Washington Regional Commission 2035 Transportation Plan

The GWRC encompasses King George and Caroline Counties in Virginia. In 2011 the commission had completed a Regional Transportation Plan intended to guide transit development and growth 25 years into the future, to year 2035. Some of the major goals included as part of the plan include improving accessibility and mobility for all, and ensuring a safe and secure transportation system.

The regional transportation system proximate to NSF Dahlgren includes many transportation amenities and infrastructure such as the major collector US Route 301 and the Fredericksburg Regional Transit Route K1 which reaches NSF Dahlgren. Although there are transportation provisions proximate to the installation, traffic congestion is still an issue that prohibits access management and emergency service routes within the County.

Some of the King George County recommendations provided in the 2035 Regional Transportation Plan that are proximate to NSF Dahlgren and affect the LOS of roadways include the following:

- VA-206 (Dahlgren Rd.): widening the road to four lanes west of VA-614 to VA-301.
- VA-218 (Windsor Dr.): Widening from 2 to 4 Lanes from James Madison Parkway (US-301) to Ridge Road (VA-205).
- US 301: Widening to rural 6-lane with median from VA-206 to VA-614.
- US 301 (James Madison Pkwy.) at VA-206 (Dahlgren Rd.): Improve signal timing; Provide additional capacity for eastbound left turn and southbound right turn movement.
- US 301 (James Madison Pkwy.) at VA-614 (Owens Dr.): provide additional capacity for east and westbound approach.
- Incorporate County bike routes in King George County, including along US Route 301.

These recommendations are vital to the continued capacity and effectiveness of the local roadways in King George County proximate to NSF Dahlgren, and implementation of these planned improvements would increase the lacking highway LOS associated with some of these roadways segments. Widening of major arterials and improving signal timing may create induced demand, although it would also accommodate for quicker emergency response times, overall reduced traffic congestion, and easier access to and from NSF Dahlgren gates.

Source: George Washington Regional Commission 2035 Transportation Plan.

Naval Support Facility Dahlgren Transportation Improvement Plan

The NSF Dahlgren Transportation Improvement Plan (TIP) was developed in 2012 for the Naval Facilities Engineering Command (NAVFAC) and details specific transportation improvements centered on and around NSF Dahlgren. As part of the TIP, a section on traffic operations details specific LOS ratings for on installation and off-installation roadways. Several roadways and intersections were recorded as having below-standard LOS ratings on the Synchro Traffic analysis conducted.

- U.S. Route 301 and State Route 206 (Main Gate) operated at LOS F during both peak AM and PM periods.
- U.S. Route 301 and Bennion Road (Gate B) operated at LOS F during both peak AM and PM periods.
- State Route 206 and Potomac Drive (Main Gate) operated at LOS B during the AM peak period and LOS E during the PM peak period.
- Bennion Road and Potomac Drive (unsignalized) operated at LOS E (for left turns) during the AM peak period and at LOS C (for left turns) during the PM peak period.

According to the LOS records in the TIP, a majority of the congestion issues are taking place proximate to Dahlgren Gate B, along US Route 301 and the Main Gate along Route 206. Recorded gate volumes at Dahlgren show that 63% of traffic used the Main Gate for inbound and outbound access, while only 37% of traffic used Gate B for inbound and outbound access. This could be due to the fact that the installation's residential areas are located proximate to the Main Gate while the installation's North Complex is located proximate to Gate B. It could also be attributed to the fact that the Main Gate has one lane of inbound traffic, while Gate B has two. An additional analysis of internal arterials shows the lowest LOS rating for an on installation roadway to be grade C, which is the minimum acceptable rating.

Section 3 of the TIP gives predictions and assessments of potential 2018 traffic counts, LOS ratings, and infrastructure capacity. 2018 projections still rated US Route 301 and State Route 206 intersections at E or F without the implementation of the recommendations the plan provides. Furthermore, the 2018 projections still expect the LOS at the Main Gate and B Gate to be rated at E or F during the AM peak periods, although it mentions that analysis would require an additional study. While a good model for looking into the future, projections could be skewed due to factors such as mission changes, possible Base Realignment and Closure Act actions, and even funding sources.

Recommendations for external transportation enhancements include improving US Route 301 and State Route 206 intersections through enhancing traffic signal timing. Another external recommendation was for improvements to Gate B including the construction of a new Gate B with changes to comply with Anti-Terrorism / Force Protection standards and address traffic queues and safety concerns. Other external recommendations are the possible relocation of the Main Gate and the potential implementation of long-term access actions.

Internal transportation recommendations provided in the TIP are broken up by complex (North, South, West, and Town Center) and included the addition of bike lanes, replacing or installing signage, striping lane lines and potentially widening heavily used roads. These internal recommendations have little to do with LOS ratings due to the fact that most on installation roadways had LOS ratings of A and B, with the exception of Aegis Way. These ratings are good for internal circulation, but have little to do with emergency egress routes out of NSF Dahlgren, which are perceived to have low LOS ratings due to the ratings given for the Gate locations and US Route 301.

Source: NSF Dahlgren Transportation Improvement Plan, 2012.

King George County Fire and Emergency Medical Service Maps

Several maps provided by the King George County department of Fire, Rescue and Emergency Services detail specific fire and emergency service incidents, hot spots, and response times for the County. One map portrays incident hot spots, on which it is shown that the second largest area of incidents is within the Dahlgren PSA, primarily to the southwest of the installation. According to the map, a large amount of incidents take place along US Route 301 and State Route 206, while an ever larger amount of incidents take place within the residential area located proximate to the NSF Dahlgren main gate. Fortunately for the victims of these incidents, there is a fire station (Company 2) located within the Dahlgren PSA, which most likely helps to reduce response times.

Company 2 has a fire station located along State Route 206, approximately one mile away from NSF Dahlgren. A map detailing response zones for each fire station portrays boundaries for each of the stations approximate response zones, providing incident counts and numbers for incidents out of coverage. For the response zone covered by Company 2, includes a large portion of the northern area of King George County. For 2013, approximately 796 incidents occurred within this response zone, for which only 93 were out of coverage. Of all response zones, there were a total of 3,126 incidents in 2013, of which 2,039 were located in response Zone 1. Only 753 of the total 3,126 incidents were in excess of a 5 mile drive time. While this may seem high, it can be attributed to the fact that response Zone 1 only contains one fire station and covers a large area of land.

A third map details the need for an additional station in the southeastern or southwestern portion of the County, portraying how five mile drive times do not reach those areas adjacent to Westmoreland or Stafford Counties.

Source: King George County Fire and EMS Maps, 2013.

Findings

- There are many planned infrastructure improvements that would increase the LOS on highways and local roadways, lower traffic congestion and provide for faster emergency response times although it is hard to deduce whether or not they will be implemented.
- The King George County Strategic Plan is a good model for emergency service planning and should be expanded upon to include NSF Dahlgren and the mutual aid agreements a bit more as well as a possible access management section. Annual review of NFPA 1720 is also a good model for evaluating response and level of service.
- None of these tools actual describe emergency response routes and average response times for emergency services.
- Pursuant to the GWRC 2025 Plan, roadway widening and bicycle lanes could sincerely reduce the amount of cars on the road which would increase response times and access management.

- The TIP is a great tool for accessing LOS ratings for roadways, highways and Gate locations, and should be updated every few years.
- Many of the recommendations given in the TIP could increase circulation, decrease congestion, and improve LOS ratings, although some recommendations may create further conflict. Depending on the potential locations, relocating Gate A could cause further congestion in the area due to the fact that most on installation residents would have to reroute their commutes on and off-installation.
- External transportation recommendations should be integrated into the GWRC Regional Transportation Plan, as well as the King George County Comprehensive Plan. King George County Capital Improvement funding could be used for some of these, which would allow for further mutual aid and response times from NSF Dahlgren egress routes to be decreased.

Issue SA-2	**Potential Incompatible Development in Safety Zones and Imaginary Surfaces with Expanded Air Operations.** Should the air mission be reactivated and expanded at Dahlgren, the identification of safety zones and vertical obstruction zones (imaginary surfaces) would be necessary and could increase the potential for incompatible development in those areas where current land use designations and zoning controls don't account for aircraft safety zones.

Although NSF Dahlgren does not currently support a fixed-wing air mission as part of their operations, should one be reestablished, any safety zones and imaginary surfaces associated with the NSF Dahlgren runways could increase the potential for incompatible development in those areas proximate to the installation.

Several recent developments along US Route 301 including the Walmart supercenter, residential uses and the University of Mary Washington Dahlgren Campus could potentially be within the APZs.

If a fixed-wing air mission was reestablished, APZs and potentially the Clear Zone (CZ) would extend north of NSF Dahlgren onto private property. While no development is recommended in the CZs, certain development is considered compatible in APZs.

The airfield is used for rotary wing and UAV operations and therefore has associated safety clearance zones which are contained within the installation.

Existing Tools

Naval Support Facility Dahlgren Master Plan

The Master Plan completed in 2011 for NSF Dahlgren provides a set of principles to guide future development, which were decided upon at an installation-wide planning charrette.

The Master Plan identifies airfield safety clearances for NSF Dahlgren, which are defined in Naval Facilities Engineering Command (NAVFAC) P-80.3, Facility Planning Factor Criteria for Navy and Marine Corps Shore Installations: Appendix E. These safety clearances are also defined in Unified Facilities Criteria 3-260-01, Airfield and Heliport Planning and Design. The clearances provide guidance for identifying obstructions to air navigation and include the following:

- Height restrictions – Restrictions in the form of specific height limits or imaginary surfaces through which objects shall not penetrate.
- Lateral clearances – Standards as to how close objects may be sited to airfield pavements regardless of their height.
- Clear zone/takeoff safety zones – The areas immediately adjacent to runway and helipad thresholds that provide for unobstructed takeoffs and landings and serve as emergency overrun areas.

A map in the Master Plan illustrates the current clearance zones, the boundaries of which are located primarily on the installation of over the Upper Machodoc Creek. Small portions of the outer horizontal surface stretch into King George County, although this does not create any safety concerns since the imaginary surfaces are not for fixed wing aircraft. The CZs and Approach / Departure Clearance Surfaces associated with Runway 16/34 are completed contained on the installation and do not extend into King George County.

Section 3.5 of the plan identifies the NSF Dahlgren vision for the airfield. Since the airfield is considered a valuable asset, land use planning is encouraged to be compatible and ensure that future development does not encroach upon the airfield safety zones which extend beyond the runway surface. During the development of the Plan, two options were considered for the future of the airfield:

Option 1. Permanently close the runway to fixed-wing aircraft and allow development within the safety zones

Option 2. Prevent further encroachment upon the safety clearance zones to preserve the capability for future missions.

The second option was chosen to prohibit future development surrounding the airfield that would jeopardize future use of the runway. The plan additionally states that the airfield safety zones should be preserved both inside and outside the installation to accommodate fixed-wing capabilities that may be reestablished. Potential changes to include fixed-wing aircraft would prompt evaluation of safety zones which would impact areas of King George County.

Source: NSF Dahlgren Master Plan, 2011.

King George County Comprehensive Plan

The King George County Comprehensive Plan provides descriptions on existing land use and proposed future land use goals for areas proximate to NSF Dahlgren, which includes the Dahlgren PSA.

Existing land use in the Dahlgren PSA contains large concentrations of commercial, residential, and office development, particularly along US Route 301 and State Route 206. Several known large subdivisions exist adjacent to the western and southern boundaries of the installation, most of which are situated along these major thoroughfares. The existing land use map in the Comprehensive Plan identifies several different land uses proximate to NSF Dahlgren and situated along US Route 301 and State Route 206 including agricultural, industrial, and residential. Residential uses along US Route 301 range from low to high density, and are located in areas where potential safety zones could be established if a fixed-wing air mission was reestablished at NSF Dahlgren. These uses may be considered incompatible dependent on which airfield safety zones they would be in.

The King George Comprehensive Plan identifies the Dahlgren PSA as a growth area. Encouraging the majority of development in the Dahlgren PSA could present safety concerns if fixed-wing air missions were reestablished at NSF Dahlgren, due to the likelihood of safety zones extending into King George County.

One of the key policies noted in the plan for the Dahlgren PSA states the possibility for potential rezoning to more dense residential and mixed-use zoning districts. This could also promote safety concerns due to the possibility of higher densities which would be incompatible with any reestablished airfield safety zones.

Source: King George County Comprehensive Plan, 2013.

King George County Zoning Ordinance

According to the King George County Zoning Ordinance, zoning in the Dahlgren PSA comprises the following districts: C-1, C-2, R-1, R-3, A-1 and A-2. The A-1 Agricultural district requires a minimum lot area of 10 acres per lot, while the A-2 Agricultural district requires a minimum lot area of two acres per lot. Since these densities may be relatively low, uses within these districts would not have densities that would interfere with the NSF Dahlgren air operations or potential future fixed-wing missions at the installation.

Commercial districts within the Dahlgren PSA include C-1 and C-2. These districts are located primarily along US Route 301 and State Route 206. The C-1 district allows many commercial, retail, and public facility uses and is intended to recognize light commercial areas. The C-2 district allows all of the uses allowed in the C-1 district with the addition of some limited manufacturing and processing uses. The minimum lot dimensions for each district are shown in Table 5-15.2.

Table 5-15.2 Commercial Zoning Minimum Lot Sizes

Commercial Zoning District	Minimum Area (Sq. Ft.)	Minimum Width (Sq. Ft.)
C-1 and C-2		
Both community water and sewer	5,000	50
Either community Water and Sewer	25,000	100
Neither community water and sewer	30,000	100

Source: King George County Zoning Ordinance, 2008.

Residential districts located within the Dahlgren PSA include R-1, R-2 and R-3 and are also primarily located along the major thoroughfares located proximate to the installation. The intent of the R-1 district is to allow single-family dwelling units and community facilities compatible with low-density development. The intent of the R-2 district is to allow residential and office areas with smaller lots with similar densities. The intent of the R-3 district is to provide for multi-family dwellings and office development of similar character and densities. For the R-3 district, total density for townhouses and multi-family dwellings should not exceed eight dwelling units per acre if neither public water and sewer is available, and should not exceed 20 dwelling units per acre is public water and sewer is available. The minimum lot dimensions for each district are shown in Table 5-15.3.

Table 5-15.3 Residential Zoning Minimum Lot Sizes

Residential Zoning District	Minimum Area (Sq. Ft.)	Minimum Width (Sq. Ft.)
R-1, R-2 and R-3		
Both community water and sewer	15,000	80
Either community Water and Sewer	25,000	80
Neither community water and sewer	30,000	100
Townhouses (community water and sewer required)*	1,500	18

*Note: *= only for R-3 zoning district*
Source: King George County Zoning Ordinance, 2008.

For these different districts that allow housing in the Dahlgren PSA, there are a range of allowable densities for developments. The densities and their associated minimum area cluster lot sizes apply to subdivisions and clusters located in agricultural and residential districts only, and are shown in Table 5-15.4.

Table 5-15.4 Residential Density Allocations in King George County

Zoning District	Allocated Density (dwelling units / acre)	Minimum Area Cluster Lot size
A-2	0.5 du / ac	40,000 sq. ft.
R-1 and R-2: Single Family duplex with public water / sewer	2.9 du / ac 2.9 du / ac	8,000 sq. ft. / 4,000 sq. ft.
R-1 and R-2: Single Family duplex with either public water / sewer	1.7 du / ac 1.7 du / ac	12,000 sq. ft. / 8,000 sq. ft.
R-3: Single Family Duplex Townhouse (community water and sewer required)	2.9 du / ac 2.9 du / ac 8.0 du / ac	6,500 sq. ft. 4,000 sq. ft. 1,200 sq. ft.

Source: King George County Zoning Ordinance, 2008.

Findings

- There is no AICUZ study specifically for NSF Dahlgren. This would be necessary if any fixed wing operational missions were reestablished.
- No airfield safety zones currently extend off-installation, although the outer horizontal surface (imaginary surface) extends off the installation.
- While there were concerns with compatibility noted in the NSF Dahlgren Master Plan, the decision made was to further prohibit development proximate to the installation that would inhibit use of the airfield, for potential of reactivation of fixed-wing operations.
- The Comprehensive Plan for King George County promotes additional denser developments in the Dahlgren PSA.
- Policies in the Comprehensive Plan include potential rezoning and mixing uses in the Dahlgren PSA. While mixed-use is probably an okay strategy as long as densities stay low, rezoning could pose incompatibility issues if densities are raised or additional heights are allowed.
- The future land use mapping associated with King George County Comprehensive Plan is by zoning. The Plan states a future land use map for this area identified the areas and development standards to be utilized- not sure if this is same map as the one with zoning.
- The proposed future residential density for this area ranges from one dwelling unit per 1 to 5 acres in those areas without public utilities. In areas with public utilities densities of up to 8 dwelling units per acre may be considered.
- The zoning ordinance for King George County limits development to low densities with the exception of clusters in the R-2 and R-3 districts. Densities from 2.9 dwelling units / acre (du/ac) to 8.0 du/ac are allowed, which may be incompatible depending on proximity to the installation.
- In the zoning ordinance, densities and minimum lot areas for the residential uses are regulated pursuant to whether or not public water or sewer is provided. The Comprehensive Plan states the lot sizes in this area are some of the smallest in the County and all of the major subdivisions are being developed on approximately 15,000 square foot lots.
- It is unclear where associated APZ's would be located off installation, if fixed-wing air missions were to be reactivated at NSF Dahlgren. If they did not extend off-installation, there would be no compatibility issue. If they did, an assessment of compatibility by use / district would have to be completed for the APZ 1 and 2.

Issue SA-3	**Potential Concerns Related to Explosive Safety Routes Through Community.** The munitions testing on NSF Dahlgren requires the transport of hazardous materials to and from the installation. Establishing explosive safety routes is necessary in order to mitigate safety concerns for both military personnel and the local community.

Currently, the state of Virginia requires a transporter permit for all transportation of hazardous materials shipments into and out of the state. Additionally, an Environmental Protection Agency (EPA) identification number is required for all transport of explosives. A weigh station along US Route 301 in the community of Dahlgren is also used to enforce trucks weighing more than 7,500 pounds. Currently, the only form of state policy to regulate the transport of hazardous materials is the Virginia Administrative Code. While it does not place any restrictions on hazardous material transportation, it identifies the capability of the Commissioner of Highways to impose emergency or temporary restrictions on the transport of such goods.

The lack of road restrictions for vehicles carrying hazardous materials is a potential threat to the relationship between NSF Dahlgren and the nearby communities. Allowing munitions-transporting trucks full access on the roads surrounding the installation can cause safety concerns.

Source: Virginia Hazardous Waste Management Regulations, Virginia Administrative Code

Existing Tools

King George County Comprehensive Plan

The King George County Comprehensive Plan details that the Department of Fire, Rescue, and Emergency Services is responsible for ensuring compliance with the Superfund Amendments and Reauthorization Act (SARA). This is to ensure compliance with state and federal mandates on hazardous materials identifications and cleanup, among other things, within the county. The department is additionally tasked with coordination and incorporation of the county's Emergency Operations Plan (EOP) in the event of a disaster. Furthermore, the department coordinates planning for hazardous materials, and radiological emergencies.

The county is also a partner for disaster mitigation planning within the GWRC area to ensure regional safety and disaster awareness. Additionally, the department is proactive in mass public notification and manages the county's City Watch (reverse 911) and the KG Alert notification systems. Although this department is proactive in regards to disaster and hazardous materials planning, it is unclear if they coordinate with NSF Dahlgren in regards to hazardous materials or explosives transportation and associated safety routes.

Source: King George County Comprehensive Plan, 2013.

King George County Fire, Rescue and Emergency Services Strategic Plan

As part of the strategic plan, an action plan is provided which details annual goals and steps to take to achieve these goals.

One of the goals for 2013 and 2014 is to publish a report identifying any changes in compliance with the National Fire Protection Association's (NFPA) Standard 1720, which provides standards for the organization and deployment of emergency and fire operations to the public. One of the steps to complete this goal is to provide an annual review of the standard, and complete a compliance matrix. One such matrix is provided in the plan, but is from 2010 and is therefore outdated. Within this 2010 NFPA 1720 compliance matrix, two standards in regards to hazardous materials were assessed:

- The participation in developing a community risk plan that details storage, use and transportation of hazardous materials is noted to have partially met the NFPA standard.
- Define the specific role of the King George County Fire, Rescue and Emergency Service department (as well as other agencies) within the risk plan for hazardous materials.

Towards the end of the strategic plan are appendices, one of which describes in detail different apparatus that are used by the King George County Fire, Rescue and Emergency Services department. One such vehicle is a cargo trailer, which is specifically used for the transportation of hazardous materials.

Another appendix notes from the NFPA 1720 assessment matrix, in which some clarification is given in regards to the two aforementioned standard evaluations. Note 6 states that a more detailed risk management plan is needed, while note 7 states that hazardous materials response is supported by state regional hazardous materials teams. While it is good that there are regional and state agencies that assist with hazardous materials response it is unclear if they assist in the transportation of these materials. It is also unclear whether or not a King George County community risk plan has ever been developed regarding the transportation of hazardous materials, as one is not available to the public. Additionally, no County hazardous materials routes are identified within this plan.

Source: King George County Fire, Rescue and Emergency Services Five Year Strategic Plan, 2012.

Regulations Governing the Transportation of Hazardous Materials

Virginia Administrative Code, Agency 20 details regulations for Waste Management, as provided and authorized by the Virginia Waste Management Board. While this particular agency has many chapters

detailing provisions for solid and hazardous wastes, only two chapters deal with the transportation of these hazardous materials. Chapter 170 provides regulations for the transportation of solid and medical wastes on state waters, which does not apply to this issue analysis. Chapter 110 gives regulations for hazardous materials transportation in the state of Virginia, which are quite similar to the standards established under the Resource Conservation and Recovery Act (RCRA).

Within Chapter 110, Section 30 gives provisions for the purpose of these regulations, which are to regulate the transportation of hazardous materials and to maintain a register of shippers and monitoring. Some of the relevant regulations included in this chapter that have the potential to affect hazardous materials transport to and from NSF Dahlgren are:

- Notwithstanding the limitations contained in 49 CFR 171.1(a) (3), and subject to the exceptions set forth in 9VAC20-110-60, these regulations apply to any person who transports hazardous materials or hazardous radioactive materials, or offers such materials for shipment.
- Pursuant to § 10.1-1454 of the Code of Virginia, any person transporting or offering for shipment hazardous materials in accordance with regulations promulgated under the laws of the United States, shall be deemed to have complied with the provisions of these regulations, except when such transportation is excluded from regulation under the laws or regulations of the United States.
- Every person who transports or offers for transportation hazardous materials within or through the Commonwealth of Virginia shall comply with the federal regulations governing the transportation of hazardous materials promulgated by the United States Secretary of Transportation with amendments promulgated as of October 1, 2013, pursuant to the Hazardous Materials Transportation Act, and located at Title 49 of the Code of Federal Regulations.
- Prior to each shipment or series of shipments of hazardous radioactive materials within the Commonwealth of Virginia, the registrant shall notify the coordinator in writing as required by 10 CFR 71.97, 10 CFR 73.37 (f) or other applicable federal regulations. The coordinator shall disseminate the notification to local law enforcement agencies, local emergency management coordinators, local fire departments, or other designated local officials along the transportation route as requested by county or municipal authorities, or as determined by the coordinator to be necessary for effective implementation of these regulations.

Exceptions to these regulations include the following:

- Nothing contained in these regulations shall apply to regular military or naval forces of the United States, nor to the duly authorized militia of any state or territory thereof, nor to the police or fire departments of this Commonwealth, providing the same are acting within their official capacity and in the performance of their duties.
- The shipment or transportation of hazardous radioactive materials by the U.S. Government, for military or national defense, that is specifically exempt from federal regulations is not subject to the requirements of these regulations. Nothing herein shall be construed as requiring the disclosure of any defense information or restricted data as defined in the Atomic Energy Act of 1954 (68 Stat 919) or the Energy Reorganization Act of 1974 (42 USCS Section 5841), as amended.

Chapter 110, Section 60 states that none of these hazardous materials regulations apply to military or naval forces and that the shipment of hazardous materials by the U.S. Government which is specifically except from federal regulations is not subject to these regulations. Aside from the establishment of explosive safety routes, a potential solution to this issue would be the incorporation of applicable military hazardous materials transportation regulations into this Chapter of the Virginia Administrative Code. This could potentially alleviate some concern about the shipment of explosive devices or hazardous materials to and from NSF Dahlgren, while it could also prompt the establishment of County hazardous safety routes.

Findings

- No explosive safety routes have been identified by NSF Dahlgren or King George County.
- The county supports several good models for disaster mitigation, including regional disaster mitigation planning with GWRC and the public notification (City Watch and King George Alert notification systems), although none of these have direct relevancy to explosive safety routes or hazardous materials (HAZMAT) transportation routes.
- It is unclear if King George County coordinates with NSF Dahlgren in regards to hazardous materials or explosives transportation and associated safety routes.
- State / regional agencies assist in the response of HAZMAT, but it is unclear if they assist in the transportation of HAZMAT.
- It is also unclear whether or not a King George County community risk plan or an emergency operations plan have ever been developed as no documents with those titles are publicly available from the County.
- HAZMAT transport for military or naval forces are not subject to Virginia (or federal) HAZAMAT transportation regulations.

Vibration

Vibration is an oscillation or motion that alternates in opposite directions and may occur as a result of an impact, explosion, noise, mechanical operation, or other change in the environment. Vibration may be caused by military and / or civilian activities.

Compatibility Assessment

Issue V-1	**Area Residents Have Reported Property Damage from Range Activity.** Dahlgren has received complaints of property damage resulting from Navy operations. The Navy has prepared a standard damage claims package that addresses community complaints of property damage resulting from Navy operations.

Some residents near NSF Dahlgren have expressed concerns about the vibrations associated with weapons firing activities at the installation. These ground-borne and airborne vibrations are generally the result of large caliber weapon systems and explosive detonations, which take place in both the PRTR and the EEA. Residents are concerned about potential damage to their homes or property. Complaints associated with noise and vibration are closely monitored by the NSF Dahlgren Public Affairs Office, who assess vibration based on building type, construction materials, and proximity to NSF Dahlgren and the PRTR. Increasing the distance between the vibration source and the off-installation structure reduces the impact caused by vibration.

Source: NSWCDD EIS for RDT&E Outdoor Activities, 2012.

Existing Tools

Environmental Impact Statement for Outdoor Research, Development, Test & Evaluation Activities, Naval Surface Warfare Center, Dahlgren Division

Section 3.5.5 of the NSWCDD Environmental Impact Statement for Outdoor RDT&E activities describes vibration. Assessing vibration caused by explosive detonations and weapons firing, the section is divided up to include both ground-borne and airborne vibration. Based on testing done on the EEA resulting from a 1,000-lb buried detonation, it was determined

that it was not likely for ground-borne vibration to cause any damage to off-installation properties.

Airborne vibration studies typically use sonic booms as the source, although for NSF Dahlgren and the 2012 EIS, airborne vibration was studied for open-area explosive detonations and large-caliber gun firing activities. The EIS details how noise and vibration monitoring was conducted at historical properties along the PRTR, which included wall vibration measurements. Five of the six historic structures studied were found to have had vibration levels below 0.5 in/second, which is a conservative level at which minor structural damage may begin to occur for glass in poorly-fitted windows or for loose glass. Most threshold levels for minor structural damage related to vibration are typically around 2.0 in/second. Almost all vibration measurements recorded for the historical structures were actually lower than 0.1 in/second, with the exception of a few measurements for the Bell House. Vibrations measured for the majority of the historic structures include foundation and exterior wall vibration, while some of the structures experienced ground-borne soil vibration and even interior wall vibrations.

As shown in Table 5-16.1, structural damage due to rattling can occur at 120 dBP (Peak sound level). In a worst case scenario, structural damage is not likely to occur until a level of 134 dBP is achieved (a level greater than any vibration experienced by private holdings around NSF Dahlgren).

Table 5-16.1 Potential Building Damage Based on Airborne Vibration

Response	Vibration Level, Inches per Second (in/sec)	Peak Sound Level (dBP)
Structural rattling and possible damage	0.1	120
Glass and plaster cracks	0.5	134
Gypsum wallboard	0.75	141
Structural damage to lightweight superstructure	>2.0	175

Source: NSWCDD EIS for RDT&E Outdoor Activities, 2012.

The EIS details how most RDT&E activities conducted at NSF Dahlgren do not generate noise and vibration in proximity to the installation above regular ambient levels, although some large-caliber firing on the PRTR may cause higher noise levels. Additionally, the EIS indicated that no buildings beyond the NSF Dahlgren or PRTR boundaries experience peak noise levels above 134 dBP. So while nearby residents may become concerned over vibrations of 120 dBP, property damage due to vibration is not a major identifiable issue at NSF Dahlgren.

Noise and vibration monitoring exists on and off the NSF Dahlgren installation. One of the off-installation monitoring sites is the Christ Episcopal Church in St. Mary's County, a National Register-listed historic resource. Members of the church requested that monitoring take place there due to concern regarding possible impacts that vibrations associated with RDT&E activities had on the church, which included the rattling of windows. Again, measurements recorded were primarily below 0.5 in/second, while a few measurements were slightly above, indicating that all were well below the threshold level for minor structural damage.

Source: NSWCDD EIS for RDT&E Outdoor Activities, 2012; Noise and Vibration Measurements at Six Historic Structures, 2010.

Findings

- While the 2012 EIS provides vibration measurements for several historic structures in the NSF Dahlgren vicinity, there are many other structures that are proximate to the installation whereby vibration is not assessed or recorded.
- Peak sound level and vibration levels given for airborne vibration are helpful but are not all inclusive to vibration measurements; there are no measurements for ground-borne vibration.
- While there are plenty of noise and vibration complaints to the PAO office at NSF Dahlgren, most of them are just complaints, and not actual destruction / insurance claims due to property damage.

- The EIS mentions some large-caliber operations are now conducted off-installation to reduce noise and vibration impacts. This may reduce impacts on the installation personnel, but it may induce impacts along the shoreline of Maryland and Virginia counties adjacent to the PRTR.

Please see the next page.

Matrix
DESIGN GROUP

Matrix DESIGN GROUP

Department of Community Development
King George County
P. 540.775.7111